UNIVERSAL MODEL AIRPLANE NEWS

MARCH 1934.

20¢

THE ONLY MAGAZINE DEVOTED EXCLUSIVELY TO EXPERIMENTAL AVIATION"

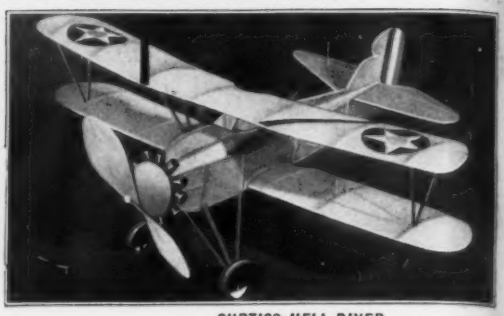
LINDBERGH'S LOCKHEED SIRIUS

Build these Famous B P A Models

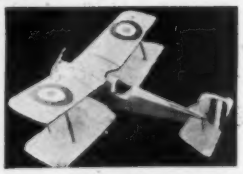
BUY KITS NOW BEFORE PRICES RISE!

FOKKER D-7 FLYING SCALE
Here's a humdinger! One of the most famous war planes..... 35c post paid

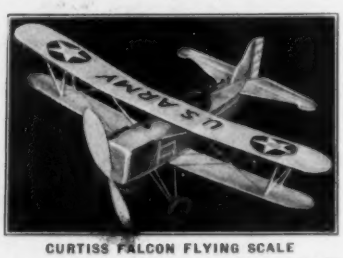
35¢ EACH POSTPAID 3 for $1



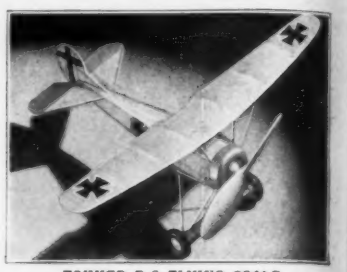
CURTISS HELL-DIVER
A marvel for realism! Used by U. S. Army officers. ..... 35c post paid



S E 5 SCOUT FLYING SCALE
English war-time plane..... 35c post paid



CURTISS FALCON FLYING SCALE
U. S. Army observation plane..... 35c post paid



FOKKER D-8 FLYING SCALE
A great fighting ship..... 35c post paid

HERE'S good advice! Now is the time to buy and build the famous BPA Models—before prices go shooting skyward! Make your choice from the marvelous line of kits shown on this page—each is a de luxe BPA Flying Scale Model Kit—each 12" to 15" wing span—the kind that the best model builders prefer! BPA stands for the highest quality of kits and supplies at the fairest, lowest prices. You get quick shipping service, and money back or exchange privileges if you are not satisfied!

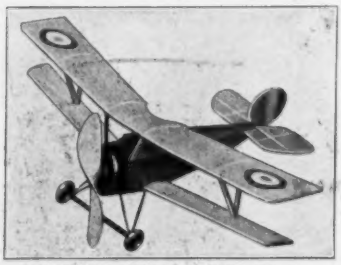
Dealers!

Write on letterhead for special discounts. Big profits in handling BPA Supplies. You get real service and sales support.

CATALOG FREE

Send 3c stamp to cover mailing cost. You'll be surprised to see this beautiful Catalog which PICTURES our many wonderful supply items. Send stamp with your order NOW!

NRA WE DO OUR PART



NIEUPORT SCOUT FLYING SCALE
A war-time fighting plane ..... 35c post paid

MONOCOUPE FLYING SCALE
A pilots' sport plane..... 35c post paid

GENERAL CONTENTS OF KITS

Each kit contains FULL-SIZE 3-view plans. Kits are complete with banana oil, cement, formed wire parts, Balsa, Jap tissue, turned Balsa wheels, etc. In sturdy cardboard boxes. And remember these kits reach you post paid.

SEND NO MONEY — JUST MAIL COUPON!

Order kits the convenient C.O.D. way—send no money. Mark coupon "C.O.D." and pay postman on delivery. If you send cash, use Postal or Express Money Order. Canadians add 2½c on orders up to $1.50, 15% on orders over $1.50. No Canadian coins or stamps accepted—use International Money Order. Print order clearly. Satisfaction guaranteed, exchanges made, or money refunded.

THE SPAD
Popular war-time fighter..... 35c post paid

BALSA PRODUCTS CO. OF AMERICA

All prices postpaid or at your dealer

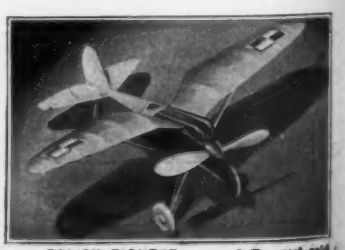
FAIRCHILD 22
Sportplane ..... 35c post paid

HOWARD "IKE" FLYING SCALE
Famous racing plane..... 35c post paid

COMET MODEL AIRPLANE & SUPPLY CO.
BPA Division,
2509 W. Cermak Road, Dept. M-43, Chicago, Ill.

( ) Send C.O.D. kits listed below. I will pay postman for kits, plus C.O.D. fee. No C.O.D. orders accepted for less than 2 kits.
( ) I enclose $.....for kits listed below.

NAME _____
Street _____
City _____ State _____



POLISH FIGHTER
Late model Polish fighting plane.. 35c post paid

Balsa Products Co. of America, subsidiary of Comet Model Airplane & Supply Co.

George D. Wanner . . . pioneer designer and builder of

MODEL AIRPLANES

Announces . . a new line of FLYING SCALE MODEL SHIPS for 1934!

WEDELL-WILLIAMS RACER
No. 24 WINGSPAN 24"

Model of the ship that carried Jimmy Wedell, Roscoe Turner and Jimmy Haizlip to new records. Wing span 24", weight 2 oz. Plans contain complete set of photographs showing every detail of construction. Ship designed for maximum flying performance and for authenticity of detail. All parts imprinted on balsa, ready to cut out and assemble. Semi-finished True Pitch propellers. Order by number today. Specially priced.

$1.00 EACH

WACO "C" CABIN TYPE BIPLANE
No. 26 WINGSPAN 22"

Wanner's model of the most popular Cabin Biplane, the Waco "C." The very latest in Waco's fine line of biplanes. The model is extremely light when compared with its large wing area and this, together with its unusual stability, accounts for its unusual flying qualities. Order today. Specially priced.

$1.00 EACH

DOUGLAS Y10-43 OBSERVATION
No. 27 WINGSPAN 24"

The Army's newest observation plane. The prototype of this excellent model has just recently been put through its paces at Wright Field, Dayton, Ohio—the government's proving grounds where a speed of about 200 miles per hour was obtained. The parasol type wing model makes it an outstanding flyer. This model is authentic to the minutest detail, wing span 24", weight 1.7 oz. Send your order today. Specially priced.

$1.00 EACH

WANNER'S COLORED AIRPLANE

LACQUERS

Large size tin tubes in the following brilliant colors: Blue, Red, Green, Yellow, Black, White.

Per bottle	$ .15
12 bottles	1.80
144 bottles	21.60
Wanner's Aluminum Powder per envelope	.10

Why Wanner Planes Are Better

All of Wanner's flying model kits are featured with full sized drawings, complete set of photos showing not only the details of construction but also a number of views of the completed plane together with carefully written instructions which make our planes the most complete obtainable. The kits contain an ample quantity of materials with semi-finished true pitch propeller. You will find that not only are the various parts shown on the drawings, but ARE ALSO PRINTED ON THE BALSA READY TO CUT OUT. You'll say, "These are the best kits yet." Our policy, flying ability without sacrificing the beauty of line of the original plane.

PUSS-MOTH
Model 25—10" Wing Span

Model of "Hearts Content" in which Capt. J. A. Mollison broke westward Atlantic crossing record from Ireland to New Brunswick. Flies extremely well. Weight ½ oz. Complete with full size drawings, instructions, and PHOTOGRAPHS showing every detail of construction. Order by number—today.

50c EACH

BALSA WOOD

Every piece so carefully selected that it is recognized as finest balsa obtainable. 36-inch lengths double price of 18-inch lengths.

1/32"x1/2"	x18"	10 for $ .05	1/8"	x3/16"x18"	10 for $ .05
1/32"x1"	x18"	5 for .05	1/8"	x1/4" x18"	10 for .05
1/32"x2"	x18"	3 for .10	1/8"	x5/16"x18"	15 for .10
1/32"x3"	x18"	2 for .15	1/8"	x3/8" x18"	6 for .05
1/16"x1/16"x18"		25 for .05	1/8"	x1" x18"	6 for .10
1/16"x1/8"	x18"	20 for .05	1/8"	x2" x18"	3 for .10
1/16"x1/2"	x18"	15 for .10	1/8"	x3" x18"	2 for .15
1/16"x1"	x18"	4 for .05	1/4"	x1/4" x18"	5 for .05
1/16"x2"	x18"	2 for .05	3/8"	x5/8" x18"	6 for .10
1/16"x3"	x18"	3 for .10	3/8"	x1/2" x18"	2 for .05
1/8"	x1/8" x18"	15 for .05	1/2"	x1/2" x18"	3 for .10

Wanner's Bamboo

1/16"x1/4"x8" Jointless Bamboo each	½c
300 pcs. to lb.	per lb. 90c
1/16"x1/4"x16" Jointless Bamboo each	.01
150 pcs. to lb.	per lb. $1.00

Wanner's Small Metal Parts

Thrust Washers (flat) large or small	½c
Thrust Washers (cone) large or small	½c
Propeller Shaft, .032 Music Wire, lt. 2"	.02

TRUE PITCH

PROPELLERS

In the semi-carved true pitch balsa propellers shown above, Wanner has produced the finest propellers obtainable, these propellers are true pitch which gives the highest efficiency in flying your various models and being semi-finished eliminates the laborious carving by hand which only the most expert can do satisfactorily.

Sizes	Price each
5"	3 for 10c
6"	3 for 10c
7"	2 for 15c
8"	2 for 15c
9"	1 for 10c
10"	1 for 12c

HOW TO ORDER

1. Go to your dealer first. If he cannot supply you, send your order to us. All orders must be accompanied by check or money order. Stamps are not accepted.
2. The price of kits includes postage.
3. All kits and supplies carefully checked and packed.
4. Special discounts allowed community centers, schools, camps, Y. M. C. A's, etc. Prices on request for Canada and foreign countries.

DO NOT SEND ORDERS FOR LESS THAN $1.00

WANNER'S

BANANA OIL

For adhesive, doping covering, sealing balsa parts. Mixed with aluminum makes finish for propellers, windows, etc.

Large bottle	$ .15
12 bottles	1.80
144 bottles	18.00

WANNER'S

CEMENT

Transparent and waterproof, dries rapidly, can be substituted for banana oil in covering planes. Mixed with Wanner's aluminum powder makes a superior metallic cement.

Small size	$ .05
Large size, single tube	.15
12 large tubes	1.80
144 large tubes	18.00

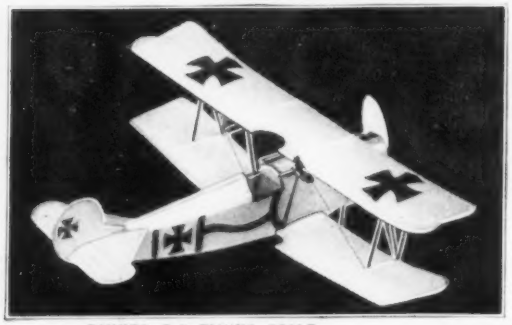
GEORGE D. WANNER & CO. 108 Webb Street, Dayton, O.

Official Supply House of A. M. L. A.

PIONEER DESIGNERS AND BUILDERS OF MODEL AIRPLANES OF QUALITY, SERVICE, FLYABILITY

Build these Famous B P A Models

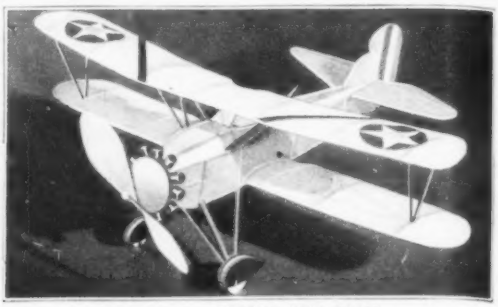
BUY KITS NOW BEFORE PRICES RISE!



FOKKER D-7 FLYING SCALE

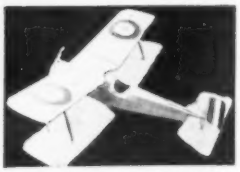
Here's a humdinger! One of the most famous war planes..... 35c post paid

35¢ EACH POSTPAID 3 for $1



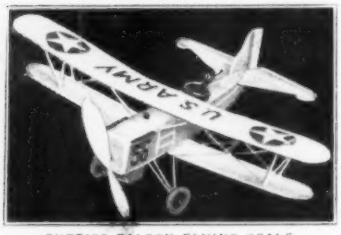
CURTISS HELL-DIVER

A marvel for realism! Used by U. S. Army officers. ..... 35c post paid



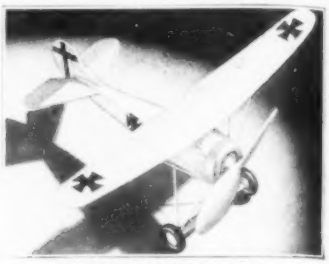
S E 5 SCOUT FLYING SCALE

English war-time plane..... 35c post paid



CURTISS FALCON FLYING SCALE

U. S. Army observation plane..... 35c post paid



FOKKER D-8 FLYING SCALE

A great fighting ship ..... 35c post paid

HERE'S good advice! Now is the time to buy and build the famous BPA Models—before prices go shooting skyward! Make your choice from the marvelous line of kits shown on this page—each is a de luxe BPA Flying Scale Model Kit—each 12" to 15" wing span—the kind that the best model builders prefer! BPA stands for the highest quality of kits and supplies at the fairest, lowest prices. You get quick shipping service, and money back or exchange privileges if you are not satisfied!

Dealers!

Write on letterhead for special discounts. Big profits in handling BPA Supplies. You get real service and sales support.

CATALOG FREE

Send 2c stamp to cover mailing cost. You'll be surprised to see this beautiful Catalog which PICTURES our many wonderful supply items. Send stamp with your order NOW!

NRA

GENERAL CONTENTS OF KITS

Each kit contains FULL-SIZE 3-view plans. Kits are complete with banana oil, cement, formed wire parts, Balsa, Jap tissue, turned Balsa wheels, etc. In sturdy cardboard boxes. And remember these kits reach you post paid.

SEND NO MONEY — JUST MAIL COUPON!

Order kits the convenient C.O.D. way—send no money. Mark coupon "C.O.D." and pay postman on delivery. If you send cash, use Postal or Express Money Order. Canadians add 25c on orders up to $1.50, 15% on orders over $1.50. No Canadian coins or stamps accepted—use International Money Order. Print order clearly. Satisfaction guaranteed, exchanges made, or money refunded.

BALSA PRODUCTS CO. OF AMERICA

All prices postpaid or at your dealer

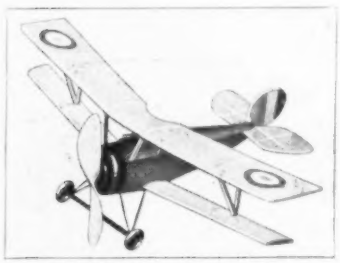
COMET MODEL AIRPLANE & SUPPLY CO.
BPA Division,
2509 W. Cermak Road, Dept. M-43, Chicago, Ill.

( ) Send C.O.D. kits listed below. I will pay postman for kits, plus C.O.D. fee. No C.O.D. orders accepted for less than 2 kits.
( ) I enclose $.....for kits listed below.

NAME _____
Street _____
City _____ State _____

MONOCOUPE FLYING SCALE

A pilots' sport plane..... 35c post paid



NIEUPORT SCOUT FLYING SCALE

A war-time fighting plane ..... 35c post paid

FAIRCHILD 22

Sportplane ..... 35c post paid

THE SPAD

Popular war-time fighter..... 35c post paid

HOWARD "IKE" FLYING SCALE

Famous racing plane..... 35c post paid

POLISH FIGHTER

Late model Polish fighting plane.. 35c post paid

Balsa Products Co. of America, subsidiary of Comet Model Airplane & Supply Co.

George D. Wanner . . . pioneer designer and builder of

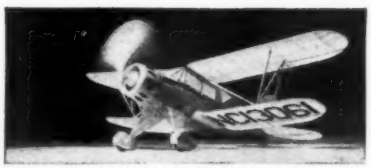
MODEL AIRPLANES

Announces . . a new line of FLYING SCALE MODEL SHIPS for 1934!

WEDELL-WILLIAMS RACER
No. 24 WINGSPAN 24″

Model of the ship that carried Jimmy Wedell, Roscoe Turner and Jimmy Haizlip to new records. Wing span 24″, weight 2 oz. Plans contain complete set of **photographs** showing every detail of construction. Ship designed for maximum flying performance and for authenticity of detail. All parts imprinted on balsa, ready to cut out and assemble. Semi-finished True Pitch propellers. Order by number today. Specially priced.

$1.00 EACH



WACO "C" CABIN TYPE BIPLANE
No. 26 WINGSPAN 22″

Wanner's model of the most popular Cabin Biplane, the Waco "C." The very latest in Waco's fine line of biplanes. The model is extremely light when compared with its large wing area and this, together with its unusual stability, accounts for its unusual flying qualities. Order today. Specially priced.

$1.00 EACH

DOUGLAS Y10-43 OBSERVATION
No. 27 WINGSPAN 24″

The Army's newest observation plane. The prototype of this excellent model has just recently been put through its paces at Wright Field, Dayton, Ohio—the government's proving grounds where a speed of about 200 miles per hour was obtained. The parasol type wing model makes it an outstanding flyer. This model is authentic to the minutest detail, wing span 24″, weight 1.7 oz. Send your order today. Specially priced.

$1.00 EACH

WANNER'S COLORED AIRPLANE

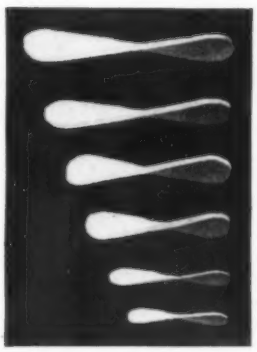
LACQUERS

Large size tin tubes in the following brilliant colors: Blue, Red, Green, Yellow, Black, White.

Per bottle	$ .15
12 bottles	1.80
144 bottles	21.60
Wanner's Aluminum Powder per envelope	.10

Why Wanner Planes Are Better

All of Wanner's flying model kits are featured with full sized drawings, complete set of photos showing not only the details of construction but also a number of views of the completed plane together with carefully written instructions which make our planes the most complete obtainable. The kits contain an ample quantity of materials with semi-finished true pitch propeller. You will find that not only are the various parts shown on the drawings, but ARE ALSO PRINTED ON THE BALSA READY TO CUT OUT. You'll say, "These are the best kits yet." Our policy, flying ability without sacrificing the beauty of line of the original plane.



TRUE PITCH

PROPELLERS

In the semi-carved true pitch balsa propellers shown above, Wanner has produced the finest propellers obtainable, these propellers are true pitch which gives the highest efficiency in flying your various models and being semi-finished eliminates the laborious carving by hand which only the most expert can do satisfactorily.

Sizes	Price each
5″	3 for 10c
6″	3 for 10c
7″	2 for 15c
8″	2 for 15c
9″	1 for 10c
10″	1 for 12c

PUSS-MOTH
Model 25—16″ Wing Span

Model of "Hearts Content" in which Capt. J. A. Mollison broke westward Atlantic crossing record from Ireland to New Brunswick. Flies extremely well. Weight ½ oz. Complete with full size drawings, instructions, and PHOTOGRAPHS showing every detail of construction. Order by number—today.

50c EACH

BALSA WOOD

Every piece so carefully selected that it is recognized as finest balsa obtainable. 36-inch lengths double price of 18-inch lengths.

1/32″	x1/2″	x18″	10 for	$ .05
1/32″	x1″	x18″	5 for	.05
1/32″	x2″	x18″	3 for	.10
1/32″	x3″	x18″	2 for	.15
1/16″	x1/16″	x18″	25 for	.05
1/16″	x1/8″	x18″	20 for	.05
1/16″	x1/2″	x18″	15 for	.10
1/16″	x1″	x18″	4 for	.05
1/16″	x2″	x18″	2 for	.05
1/16″	x3″	x18″	3 for	.10
1/8″	x1/8″	x18″	15 for	.05
1/8″	x3/16″	x18″	10 for	$ .05
1/8″	x1/4″	x18″	10 for	.05
1/8″	x5/16″	x18″	15 for	.10
1/8″	x3/8″	x18″	6 for	.05
1/8″	x1″	x18″	6 for	.10
1/8″	x2″	x18″	3 for	.10
1/8″	x3″	x18″	2 for	.15
1/4″	x1/4″	x18″	3 for	.05
3/8″	x3/8″	x18″	6 for	.10
3/8″	x1/2″	x18″	2 for	.05
1/2″	x1/2″	x18″	3 for	.10

Wanner's Bamboo

1/16″x1¼″x8″ Jointless Bamboo each	½c
300 pcs. to lb. per lb.	90c
1/16″x1¼″x16″ Jointless Bamboo each	.01
150 pcs. to lb. per lb.	$1.00

Wanner's Small Metal Parts

Thrust Washers (flat) large or small	½c
Thrust Washers (cone) large or small	½c
Propeller Shaft, .032 Music Wire, lt. 2″	.02

WANNER'S

BANANA OIL

For adhesive, doping covering, sealing balsa parts. Mixed with aluminum makes finish for propellers, windows, etc.

Large bottle	$ .15
12 bottles	1.80
144 bottles	18.00

WANNER'S

CEMENT

Transparent and waterproof, dries rapidly, can be substituted for banana oil in covering planes. Mixed with Wanner's aluminum powder makes a superior metallic cement.

Small size	$ .05
Large size, single tube	.15
12 large tubes	1.80
144 large tubes	18.00

HOW TO ORDER

1. Go to your dealer first. If he cannot supply you, send your order to us. All orders must be accompanied by check or money order. Stamps are not accepted.
2. The price of kits includes postage.
3. All kits and supplies carefully checked and packed.
4. Special discounts allowed community centers, schools, camps, Y. M. C. A's, etc. Prices on request for Canada and foreign countries.

DO NOT SEND ORDERS FOR LESS THAN $1.00

GEORGE D. WANNER & CO. 108 Webb Street, Dayton, O.

PIONEER DESIGNERS AND BUILDERS OF MODEL AIRPLANES OF QUALITY, SERVICE, FLYABILITY

Official Supply House of A. M. L. A.

VOL. X *No. 2*

Edited by Charles Hampson Grant

CONTENTS

MARCH, 1934

IN OUR NEXT ISSUE

Wings of the Army by H. Latane Lewis II gives important and interesting facts about the Army's latest planes and the purpose for which they are used.

Robert Morrison, in **On the Frontiers of Aviation** Part No. 3, gives you advance information on the latest airplanes, and excellent plans from which you may construct models of the Douglas DC-1 and the Northrop "Delta".

In **The Development of the Fokker Fighters**, Part No. 8, a vivid description of the successes of the "D" series and valuable details of their construction, is given.

In **Build the Thunder Cloud Camera Model**, Richard Crum presents instructions and plans to build one of the most interesting flying, picture-taking planes ever designed; a biplane of six foot wing spread.

Among other presentations of interest to readers are **The Aerodynamic Design of the Model Plane, Air Ways, Model News from Other Countries, N.A.A. Junior Activities, three view drawings, Aviation Advisory Board, and How You Can Make Hydrogen.**

Order your copy of Universal Model Airplane News from your newsdealer now, or send $2.00 for your year's subscription to 551 Fifth Avenue, New York City. Canadian subscriptions $2.00. Other countries $2.50.

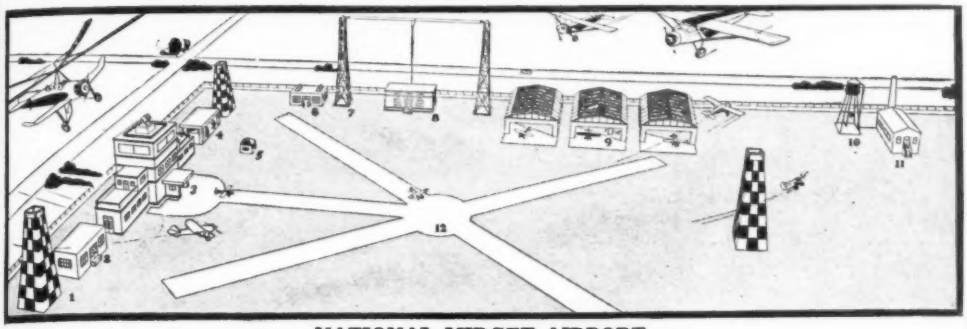
Published Monthly by JAY PUBLISHING CORP., Myrick Bldg., Springfield, Mass.
Editorial and General Offices, 551 Fifth Avenue, New York City.
George C. Johnson, President. Jay P. Cleveland, Secretary
Jay P. Cleveland, Advertising Manager, 551 Fifth Avenue, New York, N. Y.
Entered as second-class matter June 5, 1929, at the Post Office at Springfield, Mass., under the Act of March 3, 1879.

Price 20c a copy. Subscription price $2.00 a year in the United States and its possessions; also Cuba, Mexico and Panama.
$2.00 in Canada. All other countries $2.50 per year.

NATIONAL'S MIDGET AIRPORT

THE TALK OF THE COUNTRY

REAL FUN . . . . . INSTRUCTIVE . . . . . EASY TO BUILD



NATIONAL MIDGET AIRPORT
Scaled for Detail—Detailed for Scale

The complete airport features ten buildings, three pylons, water tower, radio towers, field mat 42" x 62" and a fleet of six commercial and six sport planes. Included with each unit is a detailed drawing; all wood is neatly printed to make construction simple. Doors, windows, hangar-roofs are printed on transparent material. A liberal amount of cement and colored lacquers are included, in each kit.

Hundreds of enthusiastic model builders are now busy at work constructing this interesting and educational Miniature Airport. Its recent introduction is bringing response from air-minded model builders everywere. Individually and in groups, the kits are being purchased to construct this complete and fully detailed airport. You can buy the complete kit or the individual units as you prefer. There's a real thrill in building this colorful airport. You will find it a constructive pastime during these long winter evenings.

SEND YOUR ORDER TODAY AND GET STARTED

1. Three Pylons	$ .35
2. Post Office 2¼"x4¾"	.25
3. Administration Building 5½"x12"	1.00
4.-5. Gas-Station and Refreshment Stand	.50
6. Machine Shop	.35
7.-8. Radio Towers and Radio Station	.50
9. Three Hangars	$ .75
10.-11. Water Tower and Power House	.50
12. Field Mat 42"x62"	.50
13. Six Commercial Models.	.35
14. Six Sport Models.	.35
Plus Post., Packing & Ins.	.10

All other buildings in proportion

COMPLETE AIRPORT CONSTRUCTION KIT ONLY $5.00
Plus Post., Packing & Ins. $.35

THE FAMOUS NATIONAL MIDGET FLEET

Now Numbers Twenty-Eight Different Models at 25c, 35c and 50c each plus 10c for Post., Packing and Ins.

25c Plus 10c Post.
TAYLOR CUB

Other 25c Midgets
Heath-Parasol
Curtiss-Robin
Puss-Moth
Bellanca Liberty
Plans only 10c Postage 5c

25c Plus 10c Post.
FOKKER D-VIII

35c Plus 10c Post.
BRITISH S. E. 5

Other 35c Midgets
British-Sopwith Camel
German Fokker D-VII
Plans only 10c Postage 5c

35c Plus 10c Post.
RICKENBACKER'S SPAD

50c Plus 10c Post.
FOKKER—TRIPLANE

50c Plus 10c Post.
AKRON—FIGHTER

NATIONAL FULLY DETAILED PLANS

at special prices for 30 days only

National accurate blue prints, full size, three view, makes construction simple, and assures perfect flying scale models. Make your selection and order today.

23"—1" Scale Gee Bee	$.35
12½"—½" Scale Gee Bee	.20
24" Curtiss Hawk	.25
18" Boeing P-12-E	.25
18" Boeing F-4B-3	.25
18" Curtiss Condor Bomber	.15
12" Full size—three view blue prints, with instructions for any of the 28 Midget Models, each	.10

Plans to Build Midget Airport

1. Pylons	$.10
2. Post Office	.10
3. Adm. Bldg.	.20
4- 5. Gas Station, Refresh. Stand	.15
6. Machine Shop	.10
7- 8. Radio Sta. and Tower	.15
9. Hangars	.15
10-11. Water Tower & Power House	.15

Add for Post, Packing and Ins. on one to five plans ..... $.05

ORDER TODAY

ALL ORDERS SHIPPED PROMPTLY

Attention! Model Engineers!

Limited space permits the showing of only a small part of National Kits and Supplies. The "National Bulletin" features more than 50 models—complete assortment of supplies and other valuable information.

We urge you to write at once for our latest bulletin, which we will be pleased to mail upon receipt of your request and a 3c stamp to cover mailing.

The Following MIDGETS Sell at 50c each

Post., Packing and Ins. 10c Extra

(New) Hawk P-6-E
Boeing P-12
Curtiss Falcon
Curtiss Helldiver
Texaco 13
Gee Bee Sportster 1931
Lockheed Sirius
Lockheed Vega
Laird 400
Albatross
Pfalz
Nieuport Scout
British Hawker Fury
Polish P-6
Sikorsky Amphibian
Bellanca Airbus

Plans only 10c Postage 05c

DEALERS AND AGENTS
National Kits and Supplies are in demand by model builders everywhere. Dealers featuring them are enjoying quick and profitable sales. Write today for dealer's discount.

NATIONAL MODEL AIRCRAFT & SUPPLY COMPANY

23 Avenue "E," Bluebird Building, Dept. A-45, New Rochelle, New York

Canadian Distributor: St. John Bros. & Twomey, 644 Portage Ave., Winnipeg, Man., Canada
Canadian prices 40% higher to cover duty.

If prompt service, high quality and value mean anything to you . . then you must deal with MADISON!

NOTE

All Balsa shown here in 18" lengths can also be had in 36" lengths, if requested. Half the quantity at the same price.

Balsa Wood

This balsa is clear, straight grained stock. It is strong, light, and free from defects. If hard or soft wood is desired, specify when ordering.

18" Lengths

1/16 x 1/16	30 for	5c
1/16 x 1/8	24 for	5c
1/16 x 1/4	24 for	7c
1/8 x 1/8	24 for	8c
1/8 x 3/16	24 for	9c
1/8 x 1/4	24 for	12c
3/16 x 3/16	10 for	6c
3/16 x 1/4	10 for	7c
1/4 x 1/4	10 for	8c
1/4 x 3/8	6 for	8c
1/4 x 1/2	6 for	9c
3/8 x 3/8	6 for	9c
3/8 x 1/2	6 for	15c
1/2 x 1/2	4 for	10c
1 x 1	2 for	16c

40" Lengths

1/8 x 3/8		5c
1/8 x 1/2		6c
3/16 x 3/8		8c
3/16 x 1/2		10c

18" Sheet Balsa

1/32 x 2	4 for	3c
1/16 x 2	4 for	6c
1/8 x 2	2 for	9c
3/16 x 2	2 for	8c
1/4 x 2	2 for	9c
1/2 x 2	2 for	13c

36" Plank Balsa

2 x 6	75c
2 x 3	40c
1 x 6	38c
1 x 3	20c
2 x 5	75c

Prop Blocks

1/4 x 3/4 x 3	8 for	6c
1/4 x 3/4 x 6	8 for	7c
5/8 x 1 x 7	8 for	9c
5/8 x 1 x 8	4 for	6c
3/4 x 1 1/2 x 8	2 for	7c
3/4 x 1 1/2 x 10	4 for	9c
3/4 x 1 1/2 x 11	2 for	7c
7/8 x 1 1/2 x 11	2 for	8c
7/8 x 1 1/2 x 12	2 for	7c
7/8 x 1 1/2 x 12	3 for	9c
7/8 x 1 1/2 x 14	2 for	16c

Dowels

1/8 x 30	1 for	3c
3/16 x 36	1 for	3 1/2c
1/4 x 36	1 for	4 1/2c
1/8 x 12	1 for	1c

Bamboo

Genuine straight grained, no-knot TONKIN Bamboo. Strong and light. Splits easily. Doz.

1/16 x 1/4 x 11"....9c
1/32 x 1/4 x 8"....8c
1/16 x 1/16 x 9"....5c

Japanese Tissue

A fine tissue for covering flying scale models. Strong, light, and takes dope well.

20 x 24.....3 for 5c

Veri-Fine Tissue

One of the lightest tissues known. Excellent for endurance models, because of its extremely light weight.

20 x 15.....4c

Colored Tissue

Just the thing for the new bright colored ships that are so popular nowadays. Red, Orange, Brown, Blue, Green.

20 x 24.....2 for 5c

Wood Veneer Paper

Very useful in scale and flying-scale models. Strong, yet light enough to fly.

20 x 30.....17c

Celluloid Wheels

Experience has proven these wheels best for flying scale models. Pair

5/8" wheels	5c
1" wheels	7c
1 3/8" wheels	9c
1 7/8" wheels	11c

Bushings

for wheels .....4 for 2c

Thrust Bearings

Light, strong bearings, Hole is truly centered.

	ea.	doz.
Large size		
.035 hole	1 1/2c	15c
Small size .025 hole	1 1/2c	15c

Model Making Pins

Pkg. 5c

Music Wire

Strong, springy wire sold in this new, convenient manner.

1 ft. lengths—straight .014, .020, .028, .034
6 feet for 2c.

Dummy Motors

The very thing for adding that realistic touch to scale and flying scale models. Extremely light. Nine cylinders.

1 1/2" diam.	15c
3" diam.	28c

Rubber Thread

Careful testing has proven this rubber to be the highest in energy content per unit of weight. This means more turns and less breakage.

.045 sq. ...50 ft. for 12c
3/32 flat...50 ft. for 13c
1/8 flat...50 ft. for 13c
3/16 flat...50 ft. for 16c

Washers

For indoor, outdoor, and flying scale models.

Large size, 1/4 O.D.
Dozen 1 1/2c; Per 100, 10c
Small size, 1/8 O.D.
Dozen, 1 1/2c; Per 100, 10c

Clear Cement

The fastest drying, lightest and strongest cement on the market. Try some now. You'll be amazed at its marvelous properties.

1 oz. tubes	6c
2 oz. tubes	8c
4 oz. cans	16c
1 pint cans	75c

Acetone

For thinning out liquids.

2 oz. cans	7c
4 oz. cans	13c
1 pt. cans	75c

Colored Dope

Highest quality pigmented dope. Do not confuse with inferior grades. Leaves a smooth even color upon drying.

Blue, Red, Yellow, Orange, Silver, Black, Olive Drab.

2 oz. cans	9c
4 oz. cans	17c
1 pint cans	75c

Clear Dope

Just suited for the model user's requirements.

2 oz. cans	7c
4 oz. cans	13c
1 pt. cans	75c

ALUMINUM ITEMS

Drag Rings

Used on the real ships for cutting down wind resistance. Makes a beautiful addition to any radial motored model.

1 1/2" diam.	15c
2" diam.	17c
2 1/2" diam.	22c
3" diam.	25c

N.A.C.A. Cowlings

No dummy motor needed when this cowling is used. Has a hole for thrust bearing in the nose.

1 1/2" diam.	15c
2" diam.	17c
2 1/4" diam.	23c
3" diam.	26c

Aluminum Tubing

.010 wall thickness ft.

1/8 O.D.	7c
3/16 O.D.	8c
1/4 O.D.	9c

Aluminum Leaf

Real sheet aluminum yet almost as light as paper. Makes a beautiful covering job.

.0003 thick
3 1/8" wide—5 ft. for .05
12" Sheet Aluminum
.003, 12c ft. .005, 12c ft.
.010, 25c ft.

Insignia

U. S. Army and Navy type Improves the appearance of models by 100%. Each sheet contains 4 stars in circles for the wings, and red, white and blue stripes for both sides of the rudder.

	Sheet
1" diam.	3c
1 1/2" diam.	4c
2" diam.	5c
2 1/2" diam.	6c

Sandpaper

Large Size Sheet.....5c

PLANS

24" Flying Model Travel Air "Texaco 13".....25c	Twin Pusher.....10c
Bellanca Pacemaker Flying Scale Model 14".....15c	Puss Moth De Haviland Flying Scale Model, 12".....10c
Lockheed Vega	R. O. G. 3 drawing consisting of Sr. R.O.G. Endurance Tractor and high performance R. O. G. printed on one sheet. 10c
Winnie Mae Flying Scale Model 15".....15c	
Cabin Tractor.....10c	

FREE

With each purchase of $1.00 or more, complete kit to build a lifelike replica of

Famous Dirigible LOS ANGELES

with MOORING MAST. Kit includes everything! Send your order NOW!

NRA MEMBER U.S. WE DO OUR PART

READ BEFORE ORDERING:

On Order for Prompt Delivery Please Comply With Instructions Below.

1. Orders under 25c not accepted—due to our very low prices. 2. Add 15c for packing and postage on orders up to $1.50; on orders for $1.51 and over add 10% for packing and postage charges. 3. Add 10c extra to above charges on Balsa plank orders less than $1.50 west of the Mississippi and Canada. 4. Postage stamps, Canadian or Foreign Coin not accepted as payment. 5. Remit by check, postal or express money order. Make payment to MADISON MODEL AIRPLANES, Inc., 134 Livingston Street, Brooklyn, N. Y. 6. Add 5c for insurance against breakage in transit.

Canadian Charges—Add 25c for packing and postage on orders up to $1.50. On orders of $1.50 and over add 15% packing and postage. Postage stamps, Canadian or foreign coin not accepted as payment.

MADISON MODEL AIRPLANES, INC.

134 LIVINGSTON ST. BROOKLYN, N. Y.

DEALERS AND CLUBS WRITE FOR SPECIAL PRICE LIST

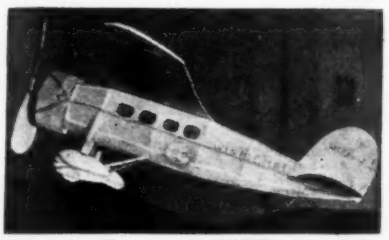
Ask for Madison's Kits and Supplies On Sale At Leading Dept. Stores Everywhere

2-in-1 KIT

Contains the around-the-world WINNIE MAE (Illustrated below) and the TRANSATLANTIC BELLANCA (above)

Both 15" wing spans, Kit contains full-size plans, bulkheads, large tube of cement and a good supply of all other necessary materals needed to complete these two wonderful models. Send your order now!

75c Add 10c for Postage



3-in-1 KIT

Three separate flying stick models; 3 fuselages, 3 wings, and 3 propellers. For a HIGH-PERFORMANCE R.O.G., a SENIOR R.O.G., and a new 11 MINUTE INDOOR TRACTOR. The retail price for these 3 models is less than some ask for plane alone.

Plans for 3-in-1 Kit—10

75c Add 10c for Postage

OUTDOOR TWIN PUSHER

The twin pusher that has actually flown 12 minutes on numerous occasions. It has many exclusive features: 40-inch "A" frame that is a marvel for lightness and strength; 36-inch high cambered, tapered wing, and two 12-inch, high pitch props, powered by 68 feet of 1/8 flat rubber. Kit contains complete plans and instructions, stamped ribs, and all other materials needed for the construction of the model.

75c Add 10c for Postage

OUTDOOR CABIN TRACTOR

This all-balsa model plane has a double surfaced, high lift wing, 30-inch span, all-balsa fuselage, extra strong landing gear to withstand the shocks of outdoor flying, and a large, wide-bladed propeller to keep it up for long endurance flights. Designed along accurate engineering lines. Kit contains complete plans and instructions, stamped ribs, large tube cement, 1 oz. bottle clear dope, pair celluloid wheels, and all materials needed to complete the model.....

75c Add 10c for Postage

DAVID'S EXPERIENCES

David is only twelve, and doesn't have much time to play, for he has to sell papers to help out at home. Extra pennies at David's house mean saving and hard work.

One day last summer the news dealer gave him some old magazines to take home, and in one of them he read about model airplanes. For weeks he saved and planned until finally the day came when he could send off for the cherished kit.

After it came he worked evenings by lamplight an hour or so at a time until finally the wonderful plane was finished to the smallest detail. That night he lay awake long after his brothers and sisters were asleep, planning the joy it was to bring them all.

It was several days before Sunday gave him the chance to fly his plane. Hopefully he launched it, but his model only hopped along the ground, then crashed. Eagerly he tried again and again, until finally he knew that his pennies and his hours of work were wasted.

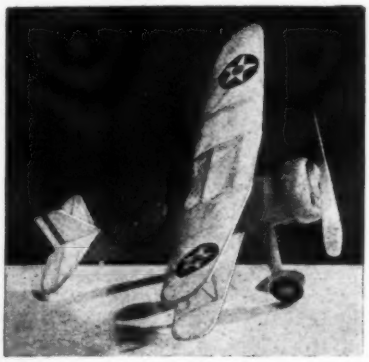
A neighbor, looking on over the fence, felt sorry for him, and explained that the model failed because of faulty design and poor balance—that it wasn't David's fault. And then this neighbor secretly wrote us a letter and sent us the money for a Pioneer kit.

We mailed it to David that same day, and he doesn't yet know who paid for it, but he's written us a wonderful letter saying his model is finished. And the Pioneer plane FLIES! It does all the things he had dreamed of for the other one, and he says he's going to enter it in a club contest soon.

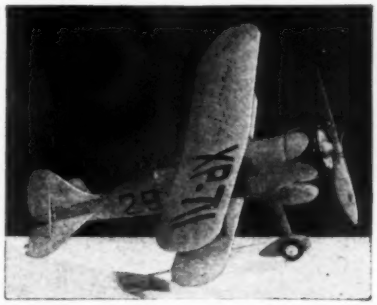
P 6E: Kit NX32 Postpaid **$1.10**

15" span—very easy to build, due to Pioneer's copyrighted method of building. When we took our first model over to the hall to test it, it flew beyond all expectations—no adjustments necessary. We could have sold a half dozen kits right there to boys who were looking on.

This model looks great in the air, and after it is unwound and comes in for a landing, it settles down as light as a feather and yet with quite a bit of speed, and the landing gear rumbles just like a big ship as it rolls along to a stop.



13½" CURTISS HAWK FIGHTER
Kit NX31 ..... postpaid. **59c**



PIONEER SECRET PURSUIT

Kit NX29 ..... postpaid. **$1.95**

Fellows, we think this the most beautiful bi-plane flying model ever offered at any price! Big 24" span, weight only 1.5 oz., designed around the Twin Wasp Jr motor. Our test model consistently flies 60-65 seconds. This kit has stamped parts, hand-carved propeller, semi-formed cowling and wheel pants . . . a value 'way beyond our low price.

← BOTH OF THESE → *for* $1.00

These low-priced kits are probably the best values ever put on the market . . . a real bargain, each of them. But that's not the best of it! You can have them both, for $1.00. Both are easy to build and excellent flyers. Get 'em both! Watch 'em fly!

WEDELL WILLIAMS LAND PLANE RACER

Kit NX44 ..... postpaid. **$1.95**

This is a tremendous bargain! A 26" span model, weighs 2 oz., and flies 40-45 seconds. The cockpit cover and open front cowling are built on the same principle as the big ship. Hand-carved propeller included in kit.

These Extras Recommended

A suitable winder, 35c. A 2 dr. vial of lubricant, 10c . . . this special Pioneer lubricant is essential to get maximum duration: it will preserve the rubber and enable about 35% more turns to be put in the rubber. Postage insurance, 5c extra.

BELLANCA

Kit NX34 ..... postpaid. **69c**

A 20" model with performance creditable to a $2.00 kit. Will fly for 45 to 50 seconds at heights upward of 50 feet, if properly built. Weighs only 6/10 of one ounce.

What Pioneer Kits Contain

Ready-cut propellers are included in lower-priced kits. Hand-carved propellers are included in kits priced at $1.95 or over. All kits have ready formed wire parts,—full-size, accurate, and easily followed blue prints,—selected balsa and bamboo,—fresh rubber of proper weight for that model, genuine Japanese tissue,—best quality cement,—banana oil and acetone in generous size containers,—and all other parts and supplies needed to properly complete the models, just like the pictures.

Why You Can Trust Pioneer

Pioneer kit models have won more places in national contests than all other kit models combined! They are properly designed and balanced and made of the right materials—that's why.

How about it?

When after hours of painstaking work, you finish up your model and take it out to try, you give the motor its proper turns, and the model takes off. It climbs like a bird and soars away, then makes a perfect landing.

That's a thrill, isn't it?

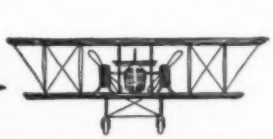
But Fellow, in order to get that kind of results you must start with a proven design, an accurate blue print, and quality materials. Pioneer kits are just that kind,—extra selected balsa and bamboo, live rubber, accurate design and plans easy to follow. That's our idea of a kit!

NOTE: Add to price of kits, postage insurance (5c), and other extras desired and mail money order or check for full amount. Please do not send stamps.

MODEL BUILDERS SINCE 1911

WE PAY THE POSTAGE

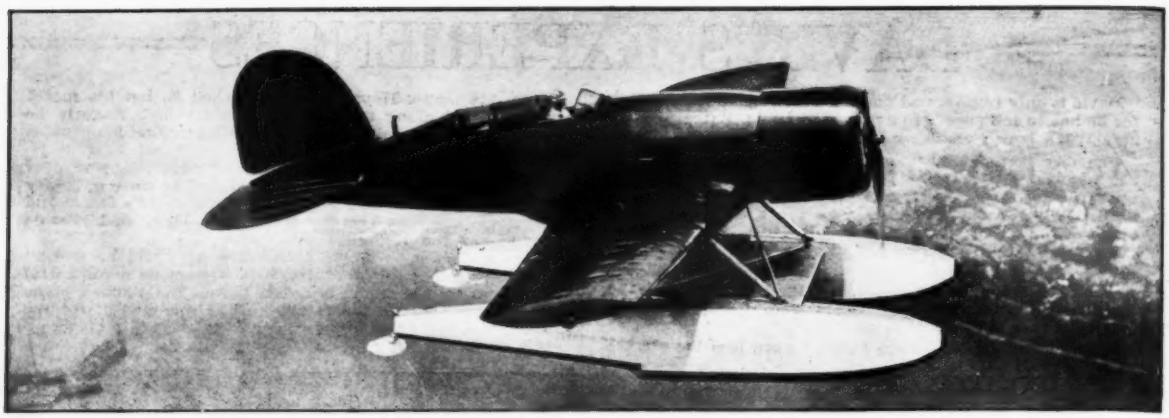
PIONEER



GUIDE AND CATALOG, 10c

MODEL•AIRPLANE•SUPPLY• CO.

Champaign, Illinois



Col. Lindbergh testing his Lockheed Sirius before attempting his memorable flight. Note special pontoons.

"Lindy" Charts the Atlantic Skies

The Purpose That Prompted Lindbergh's Recent Tour of the Continents and How It Was Accomplished Successfully

By FLETCHER PRATT

IT WAS 1927. Six men sat around a luncheon table in New York, piling up cigarette ashes long after the meal was finished. Five of the six were the type of men you would expect to find there; big business men, with greying hair and ample waistcoats; at least one of them was a millionaire. All five, however, were listening to the sixth, a shy and rather awkward young man not yet out of his twenties, and when he had nothing more to say, they prodded him with questions.

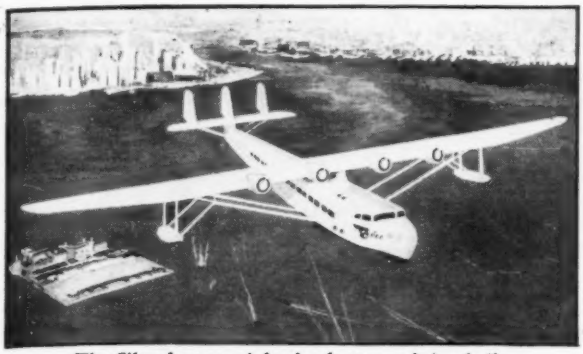
For the shy young man was Charles A. Lindbergh, the greatest air pilot in the world, just back from a non-stop flight across the Atlantic, and he was talking about the possibility of a trans-continental air service on a commercial basis. The luncheon was ostensibly only one more of those "official greetings" of which the "Lone Eagle" had already become so tired, but actually it had been arranged to discuss that very thing; for those five shrewd business men had decided that when an airplane could hop from New York to Paris, several airplanes could hop from New York to Los Angeles.

The young man told them it was very possible; the only question in establishing a transcontinental air line was that of making it as safe and reliable as a trancontinental railroad. To do that it would have to be run over a carefully selected route and be supplied with well-equipped landing fields and radio service stations. What route would be used and what would the equipment be? The young man didn't know offhand. Three weeks later he took the air in the same plane that had made the trans-Atlantic hop, to find out, as the paid representative of the five business men.

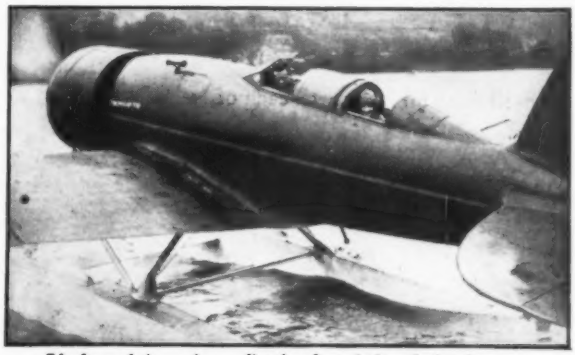
The trip lasted from July to October and was presumably a tour of the country with official greetings, banquets and all the rest of it for the conqueror of the Atlantic. Actually it was the best and most complete aerial survey ever attempted. The final report described in detail not only the route, but the type of machines that should be used on it, the location, equipment and organization of the ground stations. Just a little over a year after that report was turned in, Charles A. Lindbergh pressed the button that inaugurated the TWA trans-continental air service, with

The following is the log and mileages flown by the Lindberghs on their exploratory flights on the trans-Atlantic survey program of the Pan-American Airways System:

July 9th—New York to South Warren, Maine (near North Haven) 350 miles.
July 11th—North Haven to Halifax, Nova Scotia, 200 miles.
July 12th—Halifax to St. Johns, New Foundland, 550 miles.
July 14th—St. Johns to Cartwright, Labrador, 515 miles.
July 17th—Exploratory over Northwest River, 250 miles.
July 21st—Cartwright to Hopedale (not direct) 300 miles; Hopedale to Hebron, Labrador, 200 miles.
July 22nd—Hebron, Labrador, to Gothaab, Greenland, 650 miles.
July 25th—Gothaab to Holstensborg, Greenland, via Mt. Evans, 350 miles.
July 27th—Holstensborg to Mt. Evans and over the Inland Ice, 300 miles.
July 30th—Holstensborg to latitude 70° 10' North and return, 600 miles.
Aug. 3rd—Holstensborg to Baffin Land and return, 600 miles.
Aug. 4th—Holstensborg over the Greenland Ice Cap to Scoresby Sund and Ella Island, 1200 miles.
Aug. 5th—Ella Island to Clavering Islands, 150 miles.
Aug. 6th—Clavering Islands to Angmagsalik, 900 miles.
Aug. 8th—Angmagsalik to Godthaab, 450 miles; Godthaab to Julianehaab, 350 miles.
Aug. 12th—Julianehaab to Angmagsalik, 600 miles.
Aug. 15th—Angmagsalik to Reykjavik, Iceland, 700 miles.
Aug. 22nd—To North, East and South coasts Iceland, 600 miles.
Aug. 23rd—Iceland to Faroe Islands, 345 miles, Tverra.
Aug. 24th—Faroe Islands to Shetland Islands, 200 miles.
Aug. 26th—Shetland Islands to Copenhagen, 600 miles.
Sept. 4th—Copenhagen to Stockholm, 345 miles.
Sept. 20th—Stockholm to Helsingfors, Finland, 255 miles.
*Sept. 22nd—Helsingfors to Leningrad, Russia, 200 miles.
*Sept. 25th—Leningrad to Moscow, 400 miles.
*Sept. 29th—Moscow to Tallin, Estonia, 550 miles.
Oct. 1st—Tallin to Oslo, Norway, 500 miles.
Oct. 3rd—Oslo to Stavanger, Norway, 200 miles.
Oct. 4th—Stavanger to Southampton, England, 700 miles.
Oct. 23rd—Southampton to Galway, Irish Free State, 380 miles.
Oct. 25th—Galway to Inverness, Scotland, 450 miles.
Oct. 27th—Inverness to Paris, 700 miles.
Nov. 2nd—Paris to Amsterdam, 276 miles.
*Nov. 8th—Amsterdam to Geneva, 400 miles.
*Nov. 11th—Geneva to Santona, Spain, 600 miles.
Nov. 13th—Santona to Caldelas de Tuy (Vigo), 250 miles.
Nov. 15th—Vigo to Lisbon, 250 miles.
Nov. 21st—Lisbon to Horta, Azores, 1020 miles.
Nov. 23rd—Horta to Ponta Delgada, Azores, 180 miles.
Nov. 24th—Ponta Delgada to Las Palmas, Canary Islands, 1100 miles.
Nov. 26th—Las Palmas to Villa Cisneros, Africa, 300 miles.
Nov. 27th—Villa Cisneros to Porto Praia, Cape Verde Islands, 790 miles.
Nov. 30th—Porto Praia to Bathurst, Gambia, 400 miles.
Dec. 6th—Bathurst to Natal, Brazil, 1834 miles.
Dec. 8th—Natal to Para, Brazil, 1094 miles.
Dec. 9th—Para to Manaos, Brazil, 929 miles.
Dec. 12th—Manaos to Port of Spain, Trinidad, 950 miles.
Dec. 14th—Port of Spain, Trinidad, to San Juan, Puerto Rico, 752 miles.
Dec. 15th—San Juan to San Pedro de Macoris, D. R., 255 miles.
Dec. 16th—San Pedro to Miami, 961 miles.
Dec. 18th—Miami to Charleston, 537 miles.
Dec. 19th—Charleston to New York, 700 miles.
All flight mileages given are non-stop.
*These flights not directly connected with survey program.



The Sikorsky trans-Atlantic plane now being built.



Lindy and Anne immediately after their safe landing.

everything just as he had outlined it in his survey.

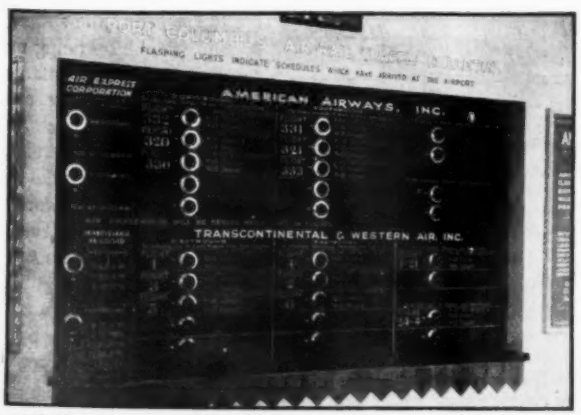
That is why, when it was announced last June that Col. Charles A. Lindbergh was going on a flight to Greenland and the general public looked on it as just another stunt, those really on the inside in aviation matters, pricked up their ears and said, "Aha! He's at it again, is he?"

Then the other facts began to come out. That Pan-American Airways had been maintaining a weather-observation station in Greenland for two years was one of these facts. That Pan-American Airways had ordered six monster seaplanes, the largest ever built, Martins and Sikorskys, with space for 32 passengers, 1000 pounds of mail and a crew of five, capable of flying 2,500 miles, and that Col. Lindbergh had acted as technical advisor for the design of the gigantic ships. And finally, just as Lindbergh reached Miami on his return trip, that Pan-American Airways had bought a new airport near New York City, with hangars to hold the new giants. This was especially significant as Pan-American's northern terminus was Washington and not New York and they were buying their new airport just as Lindbergh had finished his flight and made his report.

The Pan-American Miami Depot, typical of planned seaplane bases.

You can draw your own conclusions, just as most people in the aviation world drew theirs, but even then you would probably come short of the truth, for Lindy's flight, in many ways one of the greatest he has ever made, is not an isolated survey. It marks what is only a stage in a gigantic international effort to put commercial flying across the Atlantic on a firm basis; an effort in which all the leading air companies and pilots in the world are co-operating: a new era in aeronautical history.

It started over a year ago when representatives of Pan-American met others from the Imperial Airways of England, Air-France of France, the Lufthansa of Germany and the K.L.M. of Holland. They agreed that the job of



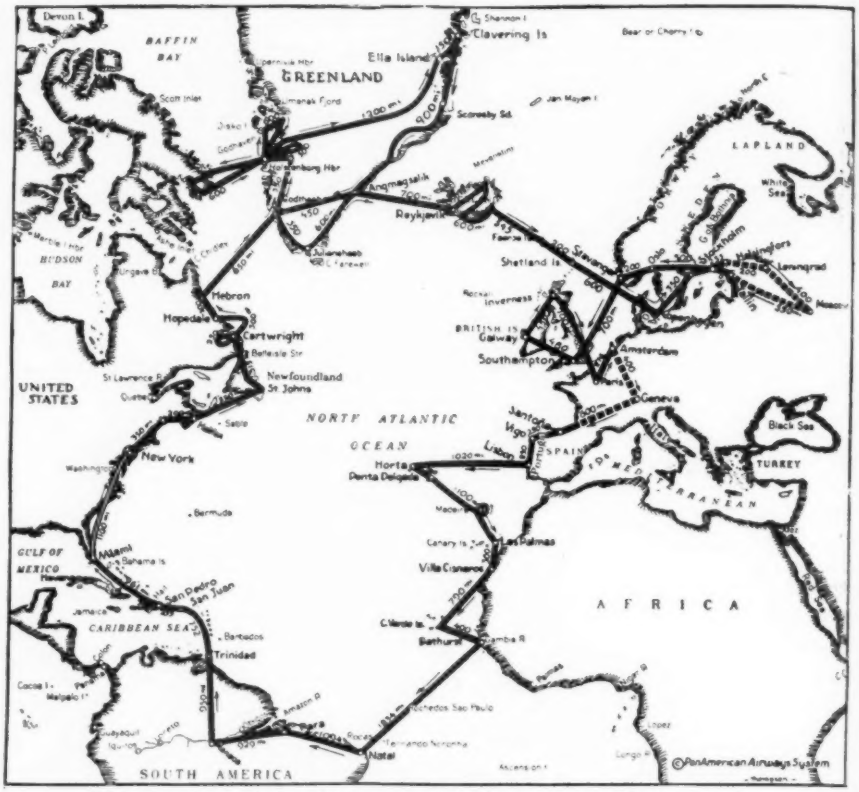
A bulletin board will be used to show arrival and departure of all planes, as shown here. Everything is systematic.

This dispatcher of the Kansas City T. W. A. base maintains radio communication with all planes. Similar stations will guide Atlantic planes.

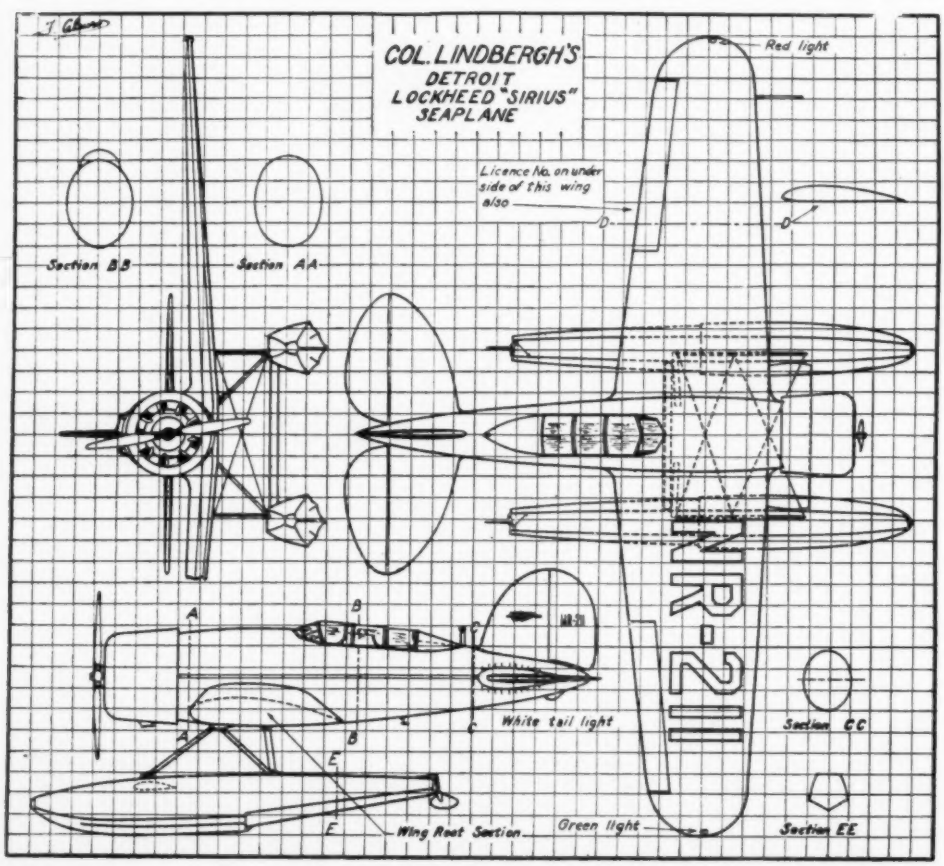
setting up a trans-Atlantic commercial flying service was too big for any one company. So the work was divided up into parts, each of the companies taking the task of surveying weather, routes, landing fields, equipment, for some part of the trans-Atlantic service, and agreeing to pool all the information gathered. When the survey was complete each would be free to get the jump on its competitors in any way it could.

There are five possible routes for flying the Atlantic; via Africa and Brazil, via Bermuda and the Azores, through Newfoundland and the Azores, straight across from Newfoundland to Ireland and the northern route from Greenland through Iceland and the Scotch isles. Pan-American was assigned the most difficult of the surveys—the Greenland route—and Lindbergh was chosen to make the survey.

Why? "Because he is the best pilot on our payroll," says a Pan-American official. "If his name was John Jones, he'd have gotten the job just the same. We sometimes wish it was; the fact that he's Lindbergh gives it too much publicity. The Germans have been surveying the Africa to Brazil route for two years without all that noise."



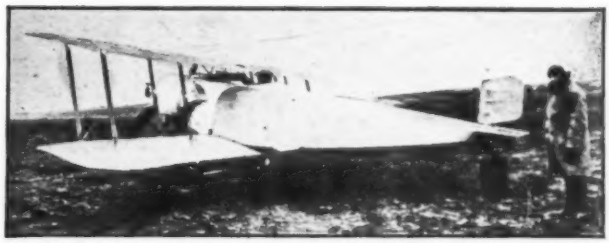
This chart shows Lindbergh's course and the distances covered on his trip.



So Lindy was chosen and as co-pilot and radio-operator, his wife, Anne Morrow Lindbergh. Again, why? Because, like her husband, she was the best qualified person for the job. She suffers in reputation by being married to a famous man but those who know about such things rate Anne Morrow Lindbergh as one of the best radio operators in the world, a first-class pilot (she has her transport license) and a navigator of a grade so good that there are few even in the navy to surpass her. It is probably lucky she went along; on at least one occasion it

(Cont. on page 36)

The Fokker M-18E, big brother of the M-17E.



Fokker and his M-17Z, one of the War's forgotten planes.

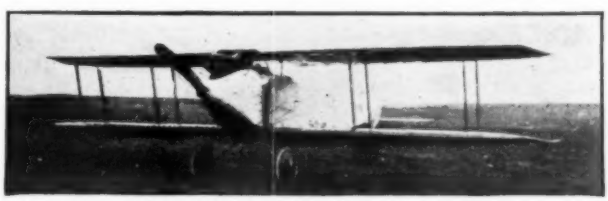
The Development of the Fokker Fighters

How Fokker's Competition With the New Albatros Fighters Resulted in the Advent of the Famous "D" Type

By ROBERT C. HARE

PART NO. 7

WHEN the Albatros D.1 nosed the Fokker airplanes from their year and a half of supremacy over the Western and Eastern Fronts, Anthony Fokker took the defeat like a man and turned once more to his drawing board. He sized up the situation and found that he had two possible alternatives: first, he might succeed the Albatros scourge by using a well streamlined plane with the heavy, low powered Mercedes 4 engine for a power plant. This he tried with little success in the design of the M-16 biplanes.



The scrappy Fokker D.1 which appeared in the spring of 1916 and put the 160 H.P. Albatros planes to shame

His second alternative was exactly opposite; he might use a very small airplane with low power and with good efficient lines get those few coveted miles per hour speed held by his competitors. Efforts in this line were also unsuccessful as shown in the design of the M-17E.

But Fokker was not to be stopped here. The next logical thing would be to try and cross the two extremes and hope that the good points of each would be brought out in a new type. The first combination was that of the low powered motor in a light edition of the older, heavier M-16 types. The new combination was termed the M-17 Zweistlg.

It might be well to mention here that the M-17Z was the first of a series of biplane types finally to evolve into the famous Fokker D.VII in the winter of 1917-1918. By comparing the picture of the M-17Z (fig. 1) with a picture of the D.VII, you will notice a decided similarity in the disposition of the wings and fuselage outline. However, when the M-17Z came out in the early summer of 1916, Fokker held high hopes for its performance and though he might have been justified by its performance he was by no means satisfied.

In general disposition the M-17Z was a two bay biplane, with heavily staggered wings without dihedral or sweepback. Both planes were equal in span. Wing construction was conventional, fourteen full ribs in each of the wing panels mounted on two main spars and a heavy leading edge. False or nose ribs were located between each full rib to help suppress pressure in a steep dive. A wire training edge giving the wing a scalloped effect was only a false edge, the actual strain being taken by a wood superstructure inside the wing connecting the ribs about twelve inches from the wire edge. Internal compression members were mounted between the spars for the purpose of anchoring the strut and rigging terminal fittings.

Interplane struts were composed of wood faired steel tubes. Tape and varnish helped prevent splitting and made them weather proof. Portions of the inner strut fairings were cut away to make room for the cable rigging. A wind anenometer to measure air speed was fastened to the front inward strut.

In line with the usual Fokker construction, the fuselage of the M-17Z was built up of steel tubes. Uprights were welded to the longerons and further braced with steel wire looped around quadrants welded to the structure. In design, the fuselage was slightly narrower than previous types in order to decrease resistance. Correspondingly, the rotary motor cowling was much more ungainly and its resistance perhaps offset the slight gain in the narrower body.

As can be seen in the picture, aluminum or an alloy was used exclusively to cover the forward portion of the fuselage, while fabric covered the remainder. For the first time a turtle deck cowling was built behind the pilot's cockpit for the purpose of continuing the rounded top effect created by the motor cowling. Welded to the upright directly behind the cockpit on the left side, was a metal tube placed horizontally as a step plate to the cockpit.

The undercarriage was of the usual "V" type construction with two wheels sprung on rubber cords. A spring tail skid at the end of the fuselage was not braced by the tripod system. The tail assembly was identical to that used

on the earlier Fokker M-16B. The framework of the elevator was entirely of welded steel strips. The rudder outline was of steel tubing of small diameter. Three streamlined section ribs were mounted on one main tube spar of steel. The rudder area seemed insufficient for an airplane of this size, and at the same time seemed very likely to collapse during combat.

The power plant of the M-17Z was a Le Rhone rotary motor of 110 HP. Armament consisted of one Spandau air-cooled, synchronized, machine-gun firing forward through the propeller. The gun was mounted directly in front of the pilot slightly to the left of the center line. Firing chamber and belt containers were easily reached by the pilot in case of trouble. Although actual performance reports of the M-17Z are not available it would be safe to estimate its top speed at between 80 and 85 MPH.

The second of the new combinations turned out to be the chunky water-cooled fighter M-18E shown in fig. 2. In this design, Fokker tried the small size type again built on the lines of the M-17E. However, instead of a small motor, the despised but only available motor, the Mercedes 120 HP. was used as a power plant.

Immediately new problems in design came to Fokker as he drew up plans for the M-18E. First of all, the motor to be used was nearly twice as heavy as the Le Rhone rotary used before. Therefore, the wing area had to be considerably increased in order to gain a usable and safe wing loading. At the same time the larger planes needed a much longer fuselage to balance them. This additional structure added considerable weight. With the use of the water-cooled motor, a large radiator was needed, or possibly two small ones could be made to suffice. The heavier airplane placed greater strains on the tail assembly, and accordingly the tail assembly had to be re-designed and strengthened for safety.

The problem of providing a safe wing loading was accomplished by building a pair of low aspect ratio biplane wings. The upper and lower planes were divided into four wing panels, each panel made up of fourteen full ribs mounted on two tubular spars. Between each full rib the usual nose or false rib was placed. The leading edge was an important member of the wing structure and acted as a third spar. A straight trailing edge of metal or wood was just flexible enough to provide for wing warp control.

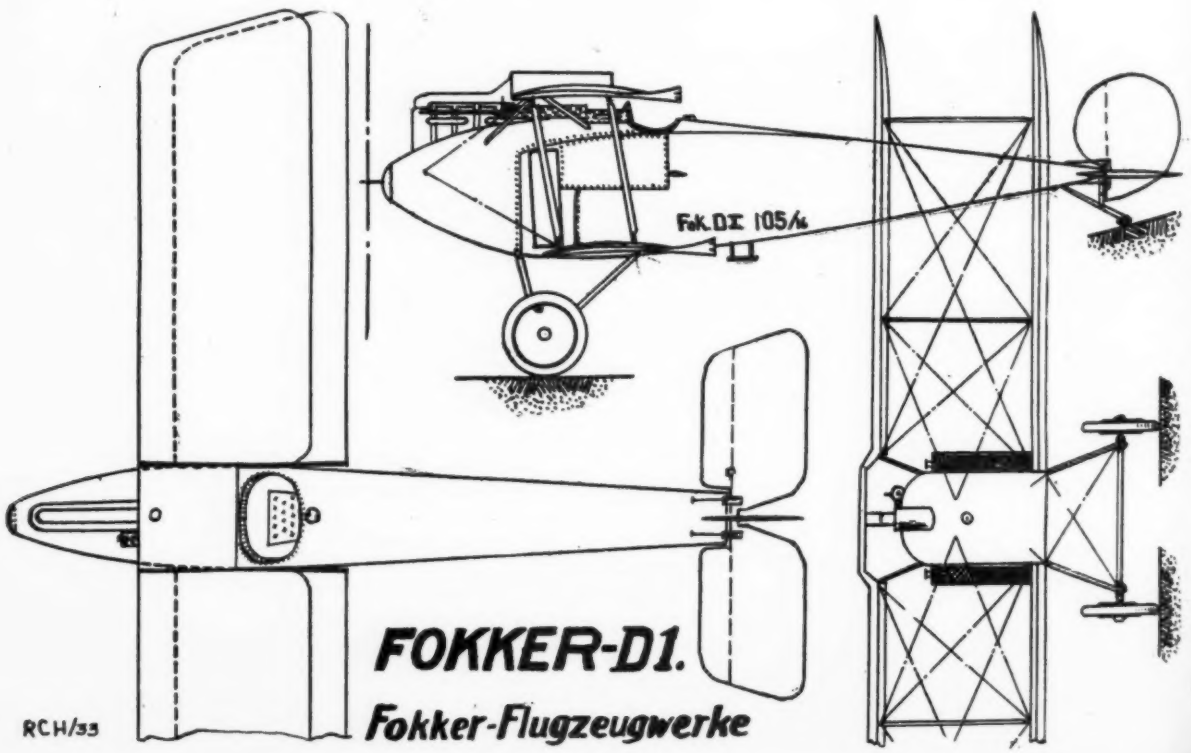
Two steel tubes streamlined with wood formed the conventional struts. In rigging the M-18E the mechanics were busy for only a few moments. Upper wing socket connections were welded directly to the top fuselage longeron. Lower wing connections were made directly to the lower longerons in the same manner. Wire rigging consisted of merely two landing and two flying cables. Since there were no center section struts to get out of order, the only parts needing minute care in assembly were the wires. This would have been a great aid in assembling planes during the rush of war.

To complete the supporting surfaces, Fokker used a stabilizer elevator of the same type employed on his previous designs. The rudder, however, was the first one to have a fin in the Fokker war line. Assume that you have a regular comma rudder as used on the E type monoplanes already described, and that you cut off the balancing portion in front of the rudder spar, you would then have an almost half round rudder, which is exactly what Fokker put on the M-18E. For a fin he fitted a triangular structure to which the rudder was hinged.

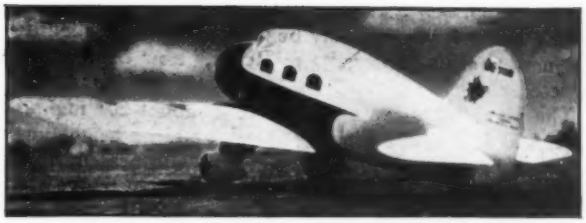
So much for the means of support. The body to which the wings and tail surfaces were attached is equally as interesting.

With the use of a vertical motor of the water-cooled variety, Fokker was able to mold the front of the M-18E

(Continued on page 42)



The B/J-XF2J-1 with "Cyclone" 800 H.P.



How the Granville will look when finished.

On the Frontiers of Aviation

Intimate Details of Airplanes That Are Leading the World in the Field of Aviation.

By ROBERT MORRISON

ARTICLE No. 2

PROBABLY the plane of keenest interest to the model builder at the present time is the large Northrop fighter to be used by the Army. The plane is similar to Frank Hawks' "Sky Chief" and the new Northrop "Delta," which will be described in a later article of this series. The fighter was recently flown from the Northrop plant at Santa Monica, California, to Bridgeport, Conn., to have a controllable pitch propeller installed. It is said that the craft carries six machine-guns and has a speed of well over two hundred miles per hour. Further statistics are not available at the present time.

The Consolidated Aircraft Corp., builders of the Navy flying boats that recently broke the world's long distance formation record, has completed another new flying boat known as the P2-Y2 and it has a cruising speed of 140 m.p.h. The two engines that compose the power plant are faired into the wing. The P2-Y2 will carry a crew of four.

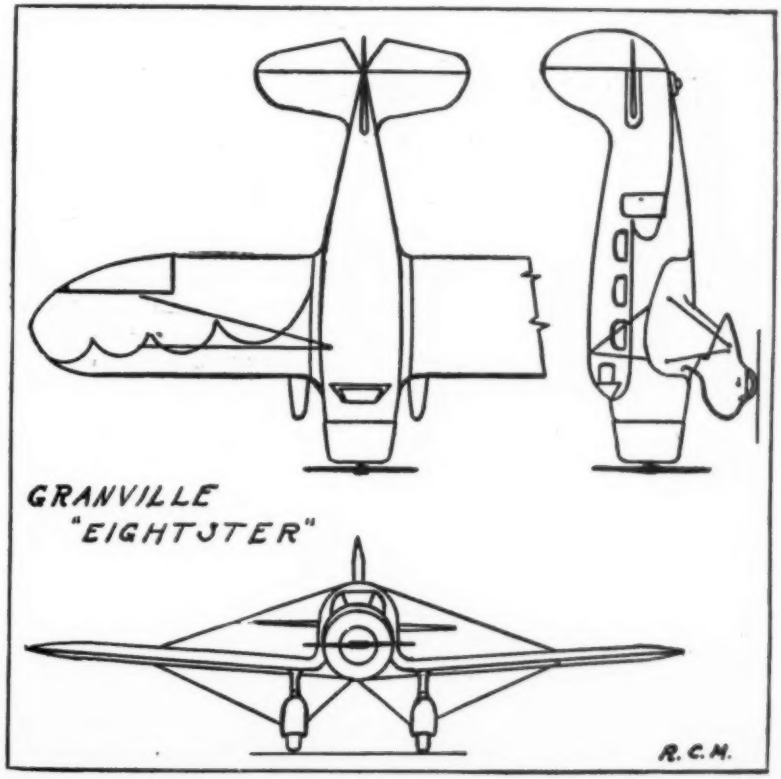
Kellett has produced another autogyro known as the K-4. The wing area has been reduced considerably. The ship boasts of a top speed of 114 m.p.h., rather high for an autogyro of the Kellett type.

Fairchild has just let it be known that they are producing a new ten-place amphibian for Pan-American Airways! This will bring the Fairchild concern once more into the air transport field which it once led several years ago with its famous Fairchild "71."

The Stinson company is now working on a new ten-place, low-wing tri-engined plane. No details are obtainable at present.

The B/J-XF2J-1 Fighter

Flight tests are now being conducted with the latest product of the B/J Aircraft Co. of Baltimore, Maryland. The plane was especially built for our Navy and is similar to former B/J military planes. At present we are not permitted to publish true performance data nor are we able to include a three-view drawing of the plane because of the wishes of the government to keep the performance data, etc., secret. Therefore, the following specifications and three-view are not guaranteed to be the XF2J-1, but they bear a close resemblance to it. The accompanying three-view drawing is that of the P-85, the predecessor of the XF2J-1. Probably the only difference in the two ships is that the XF2J-1 is powered by a double banked Curtiss-Wright Cyclone developing 800 h.p., while the P-85's power plant is one of the nine cylinder Cyclones of 575 h.p. Thus the nose of the XF2J-1 will be shaped slightly different, a wider town-end ring being employed on the XF2J-1. A photo of this ship appears at the top of this page.



This drawing may be enlarged to desired size by photostating.

The XF2J-1 will probably be used as a fighter aboard our new aircraft carrier, "The Rover," now being constructed.

The plane will have a high speed of about 211 m.p.h. at 12,000 feet and a cruising speed, at same height, of about 180 m.p.h., comparing favorably with present day military aircraft. The landing speed will be in the vicinity of 60 m.p.h. The cabin enclosure will add approximately 5 m.p.h. to the high speed. Consult three-view for further details.

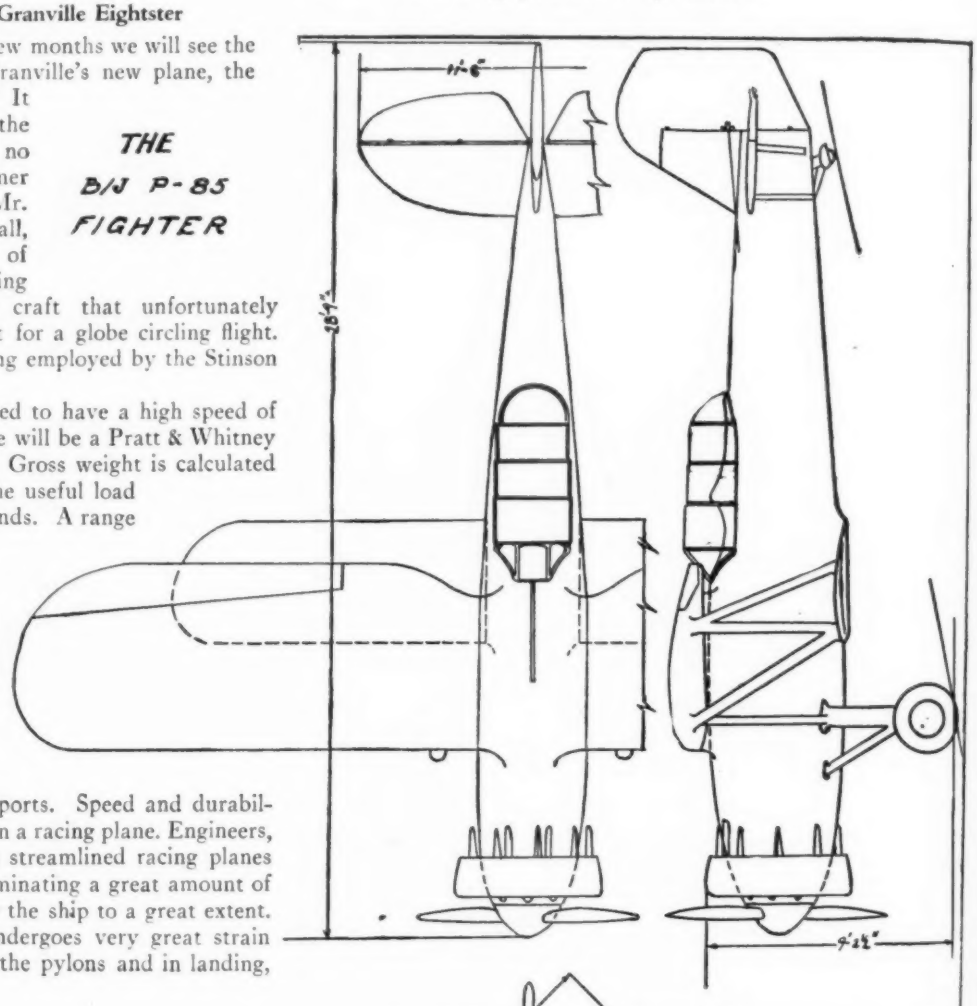
The Granville Eightster

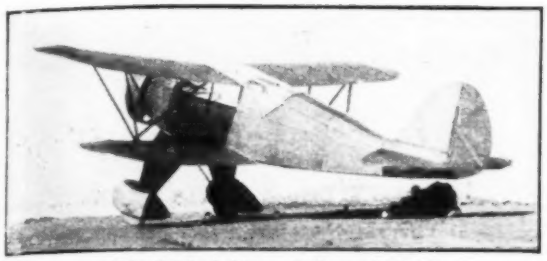
In the course of a few months we will see the completion of Mr. Granville's new plane, the Gee Bee "Eightster." It will closely resemble the Gee Bee (which need no introduction) of former years, designed by Mr. Granville and Bob Hall, who is also designer of the Springfield gull-wing and a less popular craft that unfortunately "cracked up" in a test for a globe circling flight. (Bob Hall is now being employed by the Stinson concern.)

The plane is expected to have a high speed of 225 m.p.h. The engine will be a Pratt & Whitney "Hornet" of 700 h.p. Gross weight is calculated at 7000 pounds and the useful load will be about 3400 pounds. A range of 870 miles will be obtained by the "Eightster."

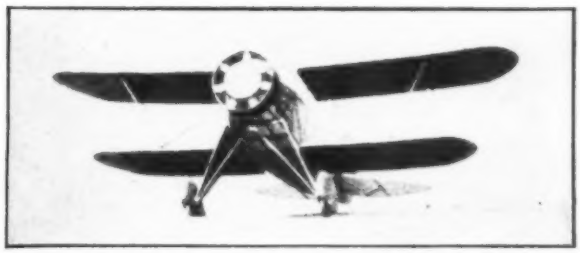
The experience gained from racing in the past National Air Races has been of very great value to those now involved in the designing of new super-transports. Speed and durability are very necessary in a racing plane. Engineers, through practice, have streamlined racing planes to the utmost, thus eliminating a great amount of drag which would slow the ship to a great extent. As the racing plane undergoes very great strain especially in rounding the pylons and in landing, the utmost in strength must be incorporated in it and at the same time not making the plane too heavy. These same characteristics are also necessary in the transport plane of today. The Gee Bee "Eightster" designed directly from the plane with which Major James Doolittle attained a speed of 294.38 miles per hour, will therefore undoubtedly be one of the greatest air transport developments the world has ever seen.

The engine will be enclosed in a large cowl and it is said that there will be no more drag from this air-cooled engine than there will be from a water-cooled one. The cowl will be of large proportions in order to surround the engine, therefore causing the fuselage also to be rather huge. The air passenger will then have plenty of room in the cabin to insure the best of comfort as he slips through the air, looking out the large windows of the cabin at the landscape thousands of feet below. Who would enjoy anything better than flying in such a craft, separated from the noise of the engine. The wing span is 47 feet, 9 inches.





The finished ship ready for a trial flight



The lines of the large plane have been faithfully followed

How You Can Build the Waco Cabin Plane

Complete Data That Will Enable You to Create an Excellent Flying Scale Model With Unusual Stability

By JOSEPH KOVEL

THE Waco Cabin Biplane is the latest creation of the Waco people and is the last word in fast yet comfortable transportation. The ship is pleasing to the eye, very graceful and efficient in flight.

The model strongly resembles the original plane, both in general contours and in flight and is well worth putting your time and labor into. It is exceptionally stable, having unusual anti-stall tendencies, and has free wheeling, which improves the glide of the model after the motor has unwound.

In order to get the best results, read the following instructions and study the plans carefully before starting actual work on the model.

The model in full flight at considerable altitude

Fuselage

Select a soft board to work on, set the plan on the board, lay a sheet of transparent waxed paper over the plan, then tack them both to the board.

Construct the sides of the fuselage by pinning the longerons to the drawing and cementing the various struts into their proper positions, (fig. 1 and 2). When the cement has dried, assemble the two sides as shown in top view, taking care to get them lined up right. The formers are then cut out of 1/32" sheet balsa and cemented into place. The stringers (1/32" x 1/16") are now ready to be cemented to the formers.

The motor stick (1/8" x 3/16") is attached to the nose block, which is made of a medium grade of balsa, (fig. 3). Cement the rear hook to the motor stick and insert the eyelet into the nose block, cementing it firmly into place.

Cut the landing struts "S" out of 1/16" sheet balsa, sand them smooth, then cover them with blue jap tissue, (or any other colored tissue that you may prefer). The wheel pants are each made up of three pieces, the center piece 3/16" thick, and the two sides 1/16" thick. Cut the parts to shape, then cut the centers out as shown in fig. 4. Cement the sides to the center piece, then streamline the unit. When finished, give the pants a coat of dope, sand lightly, then glue the washers in place, (fig. 4).

The wheels are cut out of 1/8" sheet balsa, sanded, given a coat of dope, then sanded lightly. Cement a washer to each side of the wheel, insert the wheels into the pants and secure them by bending the projecting end of the pin at right angles. It would be advisable to apply a bit of grease to the wheels and axles in order to insure smooth running.

Make the landing gear fittings, (fig. 4), and cement them to the struts. When dry, cement the struts to the fuselage, (fig. 1 and 4). Cement the pants to the struts, making sure to get them in line, and then make strut "Y." This is made by bending a piece of 3/64" round bamboo over a candle into the proper shape. Make hood "U," then cement it to former "G" (fig. 4). Cement strut "Y" to the wheel pants, then tie the bend of the strut to hook "U" with a few strands of light rubber. This will give you an efficient shock-absorbing landing gear.

Make the tail skid by bending the wire to shape (fig. 2), cementing the balsa wheel to it, then cementing the bottom center stringer.

Stabilizer and Rudder

Take a piece of bamboo, about 1/16" thick by 1/4" wide and 12" or over in length and bend it over a candle to the shape of half the stabilizer outline. Strip off two pieces 3/64" thick, round them to correct size (3/64" rd.), then cement the two pieces together, (fig. 2). The center spar is 3/32" x 1/16" at the center, tapering down to 1/16" sq. at the ends, while the ribs are 1/16" sq. Cement these into their proper positions, then set the stabilizer frame aside to dry. The rudder is made in the same manner.

The tail fairing "Q" (fig. 2) is made of 1/64" light sheet balsa and is cut to the shape shown. The front end of this tail fairing is cemented around former "F,"

(Continued on page 45)

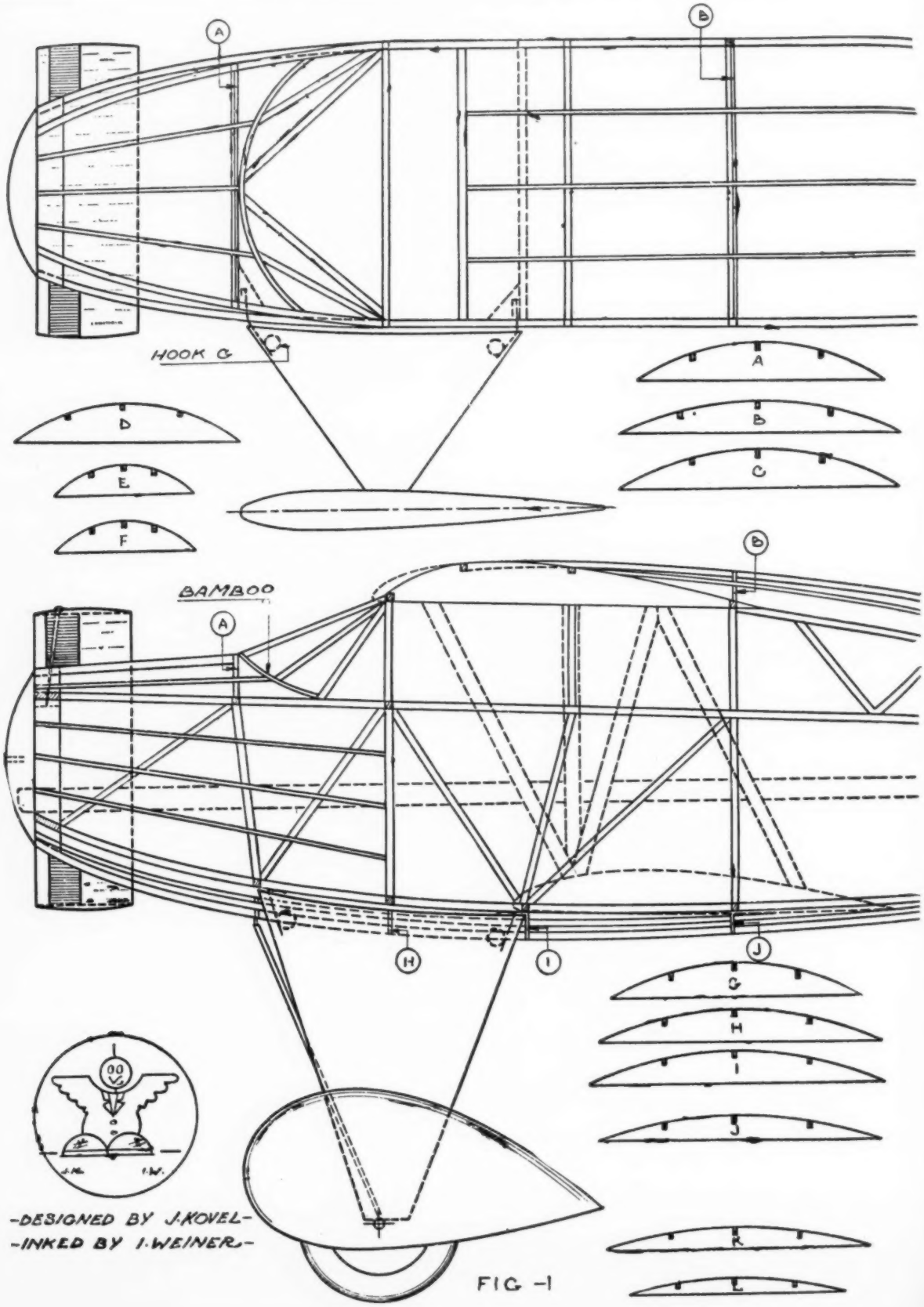

A
B
HOOK C
D
E
F
A
B
C
BAMBOO
A
B
H
I
J
G
H
I
J
K
L
-DESIGNED BY J.KOVEL-
-INKED BY I.WEINER-

FIG -1

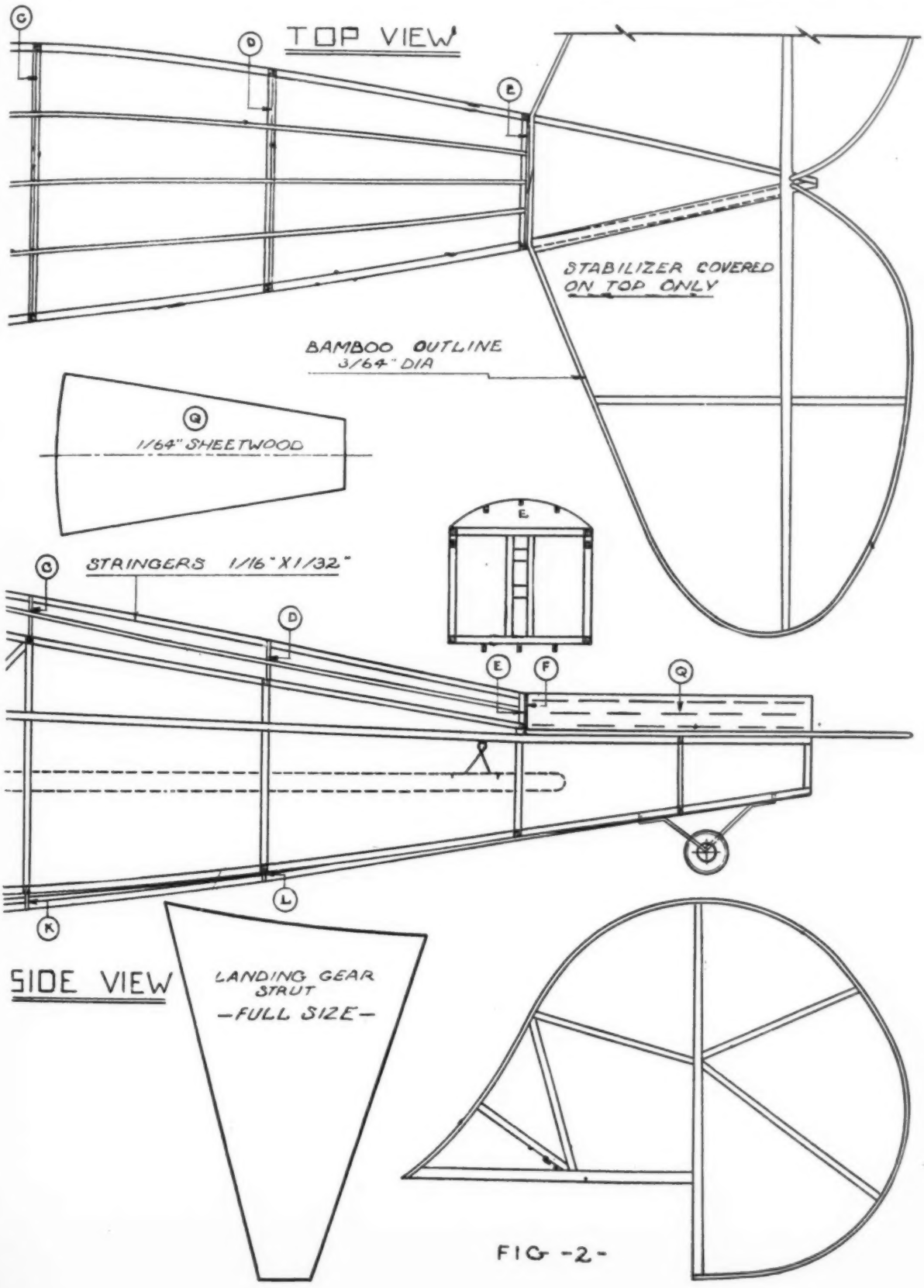

TOP VIEW
STABILIZER COVERED ON TOP ONLY
BAMBOO OUTLINE 3/64" DIA
1/64" SHEETWOOD
STRINGERS 1/16" X 1/32"
SIDE VIEW
LANDING GEAR STRUT -FULL SIZE-

FIG -2-

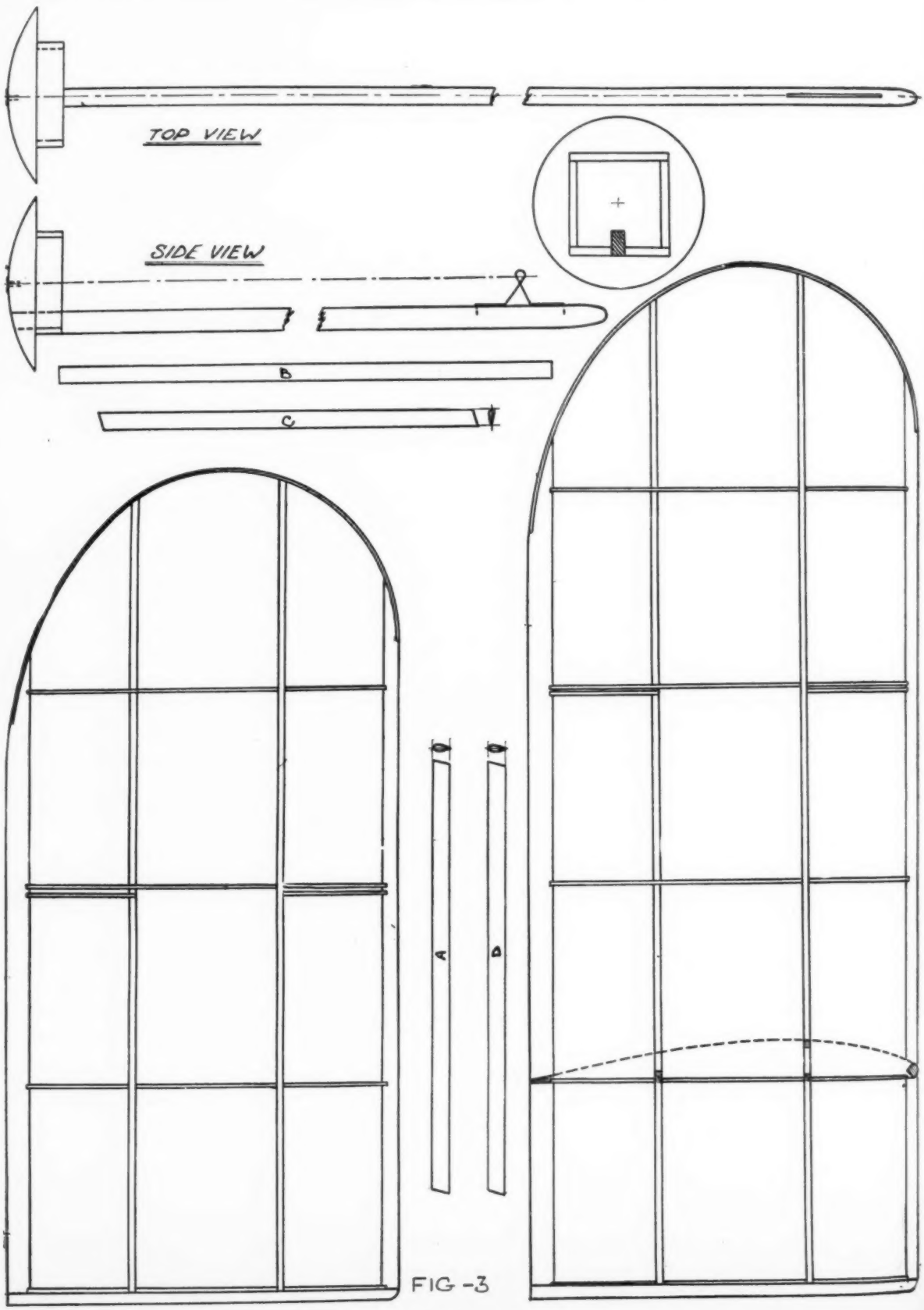


FIG -3

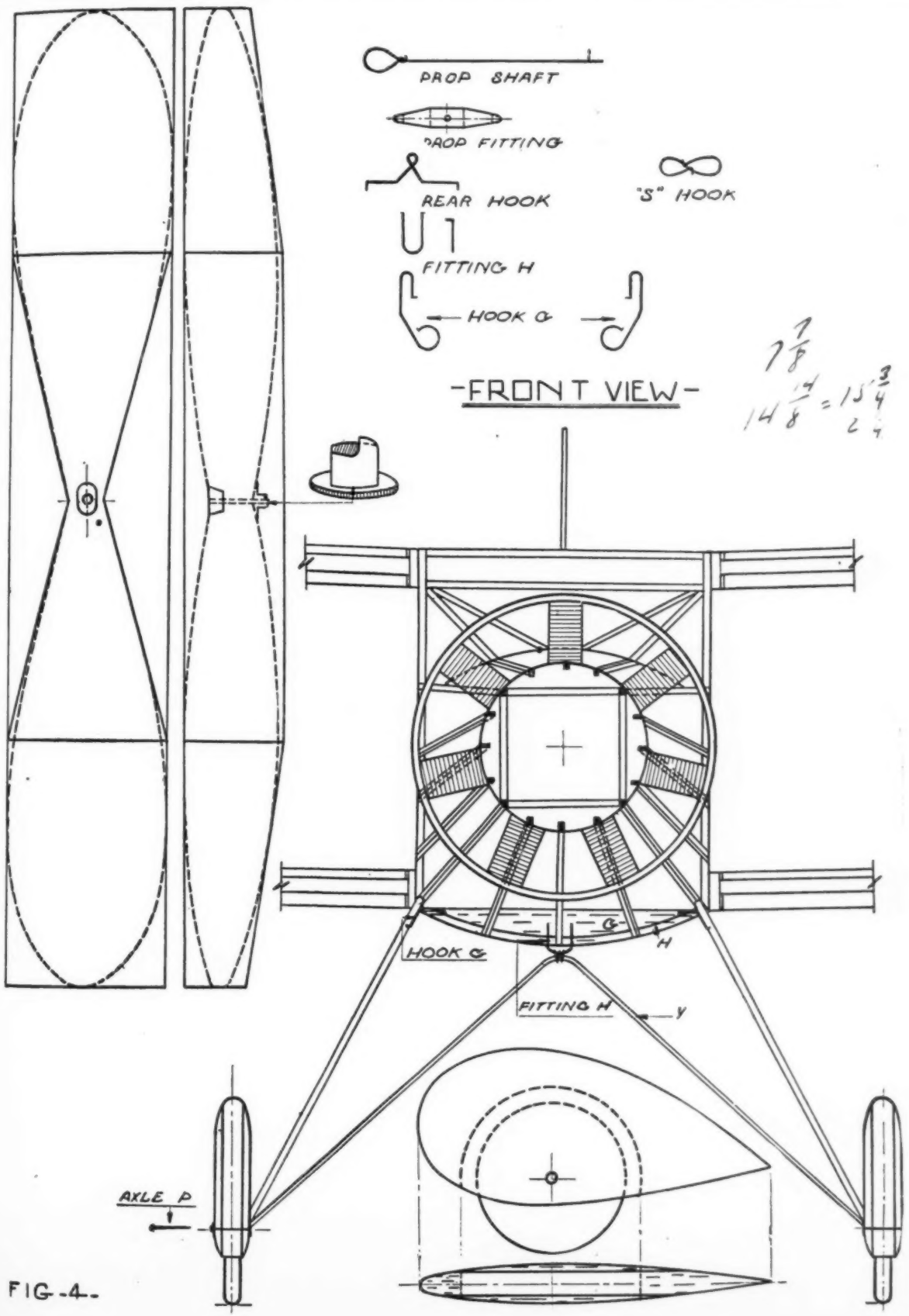
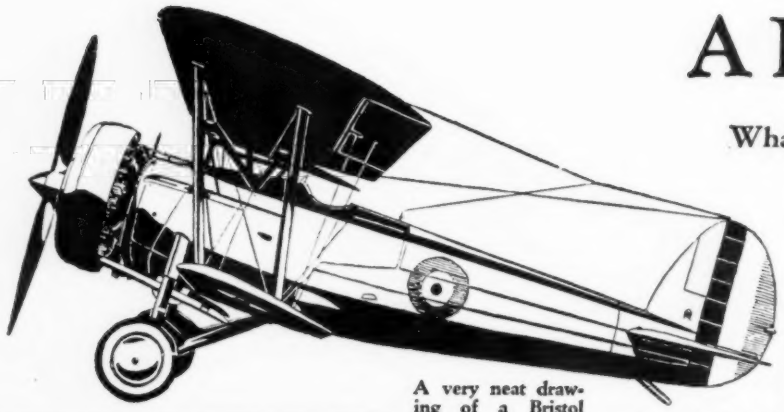

PROP SHAFT
PROP FITTING
REAR HOOK
"S" HOOK
FITTING H
HOOK G
-FRONT VIEW-
HOOK G
H
FITTING H
y
AXLE P

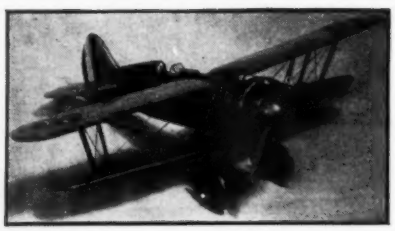
FIG-4-

AIR-WAYS

What Readers Are Doing to Increase Their Knowledge of Aviation in All Parts of the Country



A very neat drawing of a Bristol Bull Dog. Guess who drew it.



Pict. No. 4. A B/J pursuit ship built by Bryant Mudge of Norwalk, Conn. It is a very neatly constructed job.

MORE interesting news is coming from our readers all over the world. Recently we received a letter from Foster Stone of 1223 5th Ave., N. W., Moose Jaw, Sask., Canada. He has been bitten by the gasoline engine model bug, which has wrought havoc generally throughout the country. Many expert model builders have neglected the rubber-powered models to experiment with this new and interesting type of model.

Picture No. 1 shows Stone's machine. It has a wing span of 5' 6" and an overall length of 36". It is powered by a Brown Jr. motor. Stone says he has not been able to fly it yet because of the cold weather which has had a bad effect upon the running of the motor. We hope that Stone will send us more news of his model as soon as possible. There are many readers anxiously awaiting news of the success of this type of ship.

Pict. No. 1. Another gas model built by Foster Stone of Sask., Canada. Cold weather has delayed the test flights.

Mr. Mervyn G. Davies, a free lance model builder living at 286 Pascoe Vale Road, Essendon, W.5, Victoria, Australia, becoming tired of building rubber-powered models, has turned his attention to gliders. Picture No. 2 shows Davies with his model Bowlus Sailplane. The details have been very carefully followed out. In picture No. 3 it is in full flight coming in for a landing. He says that he built the model from plans published in this magazine some time ago. He has had many successful flights with it.

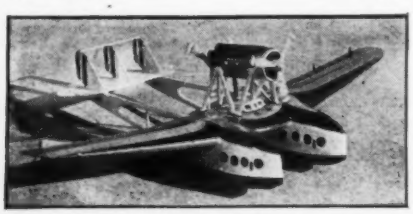
Pict. No. 2. Mervyn Davies of Victoria, Australia and his Bowlus Sail-plane.

Pict. No. 3. Davies' sailplane in flight, coming into a gentle landing.

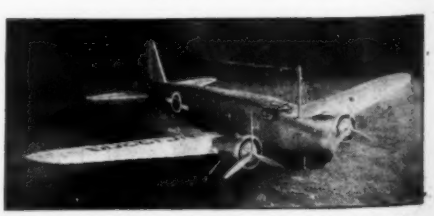
Pict. No. 10. Jackie Cooper seems to be an aviation fan. Here he is with some of his models.

Pict. No. 5. Joe Nieto's flying model Boeing P.12C.

Picture No. 4 shows a very fine job of a B/J Pursuit Ship built by Bryant Mudge of 80 Strawberry Hill, East Norwalk, Conn. Not only is Mudge's ship carefully constructed and well finished, but the photographs which he sent are



Pict. No. 7. An 18" Savoia Marchetti that is beautifully made; by Harvey Schubring of St. Paul, Minn.



Pict. No. 6. One of the best scale models of a Boeing 247 we have seen, built by Richard Pratt of Athens, N. Y.

HERE *and* THERE

Send in Pictures and Details of Your Experiments in Aviation. Tell Others What You Are Doing

Pict. No. 8. This Travel Air by Mr. Marnion was sold to the owner of its big brother.

perfect. Due to lack of space we are only able to print one view of the ship.

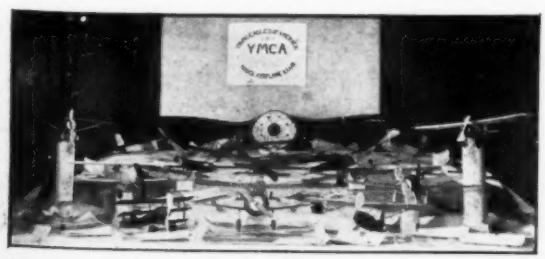
Many of the young men recently have sent in pen and ink and pencil drawings for publication. We regret exceedingly that one of these a month is the most we can use. We would rather not encourage our readers to send them to us. Primarily the readers are interested in seeing the type of models other fellows are building and how well they do their work.

Our old friend Joe Nieto of 2021 S. Hackberry St., San Antonio, Tex., submits another picture. Picture No. 5 is of his Boeing P12C flying scale model. Joe finds very little difficulty in building a model which flies and yet has all the details of a non-flying model. This is a snappy looking ship. Even the propeller is made to scale. Of course with this very small propeller a long flight cannot be made, but by adding a flying prop the performance is increased considerably.

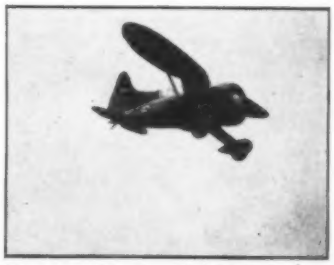
Richard Pratt of Athens, N. Y., Box 15, has put 5 years of experience and many hours of hard work on his Boeing Transport 247, shown in picture No. 6. It has a wing span of 23". The fuselage and motor are of built-up construction. The body is covered with 1/32" balsa. The wings and tail surfaces are paper covered. In the cabin are ten seats and other details just like a big ship. We notice in the picture that Pratt has not forgotten the radio mast and aerial. It is a swell job.

Pict. No. 13. Jesse Davidson launching a D. H. Gypsy Moth with a parachute—equipped frog as passenger.

Another expert builder, Harvey Schubring of 1779 Bayard Ave., St. Paul, Minn., sends a view of his handiwork. Picture No. 7 shows his Savoia-Marchetti solid scale model which is built entirely of pine. The color scheme is yellow wings with purple stripes, motor and struts of silver. The elevators, rudders and floats are white. The wing span is 18". Careful examination will show



Pict. No. 15. Model exhibition of the Freeland, Pa. Model Airplane Clubs. Example of what small communities are doing.



Pict. No. 12. A model Hall Springfield racer in flight, with the aid of wires. By Jesse Davidson.

Pict. No. 11. A clever 6" scale model of a Boeing pursuit ship built by A. F. Kitchel, Jr., of New Haven, Conn.

Pict. 14. At the Kansas State Model Contest

Pict. No. 17. Some of the judges of the T.W.A. scale model contest sponsored by the Aero Model Builders Guild.

Pict. No. 9. At Casey Jones' aviation school for juniors.

Pict. No. 16. Winners and judges at the High School Aviation Day at Floyd Bennett Airport. Commander Hawks presented the Texaco Trophy to John Janesik.

Pict. No. 18. Members of the Jackson Heights model airplane club, each one of whom build one model every week. They are under the leadership of Mr. Garami, (indicated by a cross), who is an experienced builder.

Schubring to be a very careful workman. The job is extremely neat and all details well carried out.

Edward Manion of 1120 S. 24 St., Lincoln, Nebr., has been kind enough to send us some pictures of his models. We select pictures for publication usually upon the quality of the photograph and the interest that our readers will have in any particular model. Manion sent several pictures of his own models and one of his brother's. We are sorry not to be able to print one of Edward's, for his brother wins with respect to the aforementional qualities. However, it is all in the family.

Picture No. 8 shows a model of a Gypsy powered

(Continued on page 44)

Model News From Other Countries

Pict. No. 1. Members of the Tasmania Model Club (Back row).

GREAT news comes from Mr. Ivor Freshman, Secretary of the Model Flying Club of Australia. The spirit of the N. A. A. seems to have permeated that far-off country, for Mr. Freshman has planned to organize the model flying clubs of that country under the new Junior N. A. A. organization. Previous to this date model fliers in Australia have been building their planes and setting records under different specifications than model builders in this country. For this reason, it has been difficult to compare records and organize data that can be used by both countries. This new step brings the model fliers of these two countries closer together and helps each to benefit from the experience of the other, to a fuller extent than has ever been possible before.

Pict. No. 2. A fine model in flight built by J. Argust, Sec'y. of the Lithgow branch of the M. F. C. A.

The basis for comparison of models and performances has now been established. Mr. Freshman has appointed suitable directors of the several states and districts where branches exist. These gentlemen will represent the N. A. A. whenever official trials are to be held. Official trials will be carried out on the last Sunday of each month in Centennial Park, Sydney, Australia, where they now fly for the Angus & Coote cup and Percy Marks trophy.

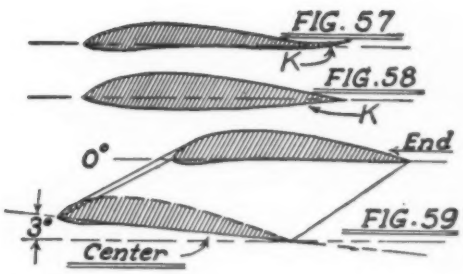
Probably most of our readers think that Tasmania is a remote and uncivilized country. However, picture No. 1 proves that this is not a fact. In the picture is shown a group of experienced model builders. The back row consists of members of the Tasmania Model Club. The front row are the "Penguins" or beginners, who are given their chance to show what they can do also. As the younger boys become proficient in the art of model building they are admitted to the more advanced

(Continued on page 38)

Pict. No. 3. Two paper models by W. Rigby, 3" span and 28" span.

Pict. No. 4. A paper supermarine takes a turn at full speed; built by W. Rigby.

The Aerodynamic Design of the Model Plane



Forces That Effect the Longitudinal Stability of an Airplane in Flight and How They Act

By CHARLES HAMPSON GRANT

ARTICLE NO. 25 CHAPTER NO. 3

IT IS very important to know what to do in order to make your plane stable and a good flyer, but it is also essential for designers to understand the principles and reasons governing the problem. Having given you data that will make your planes longitudinally stable (in the March to October issues of this magazine), if properly applied, it is fitting now to discuss these principles for your further enlightenment.

Longitudinal stability has been defined as that quality possessed by an airplane which causes it to resist or recover from any displacement about the lateral axis. If an airplane has a tendency to nose up into a stall, or dive without returning to a normal flight position quickly and readily, it is longitudinally unstable.

The factors that keep a plane in true flight position or cause it to recover its balance are the forces that act upon the plane when in flight. Obviously then a study of stability involves primarily a complete analysis of these forces acting upon the plane while it is in various attitudes that it may assume in flight.

What are these forces? The first one we think of probably is *weight*. Gravity tends to pull the plane towards the earth when it is in the air, with a force equal to its total weight. This force acts at a point within the structure of the airplane called the center of gravity, which is shown in Fig. No. 86 at (C.G.). Our regular readers probably are familiar with this jinx of plane designers. The correct calculation of the amount and position of this force is the first consideration of the airplane designer and during the process of design, he is continually checking the accuracy of its position and value.

The second force which centers the problem is *lift*. Upon the *value* of this depends the ability of the plane to lift itself from the ground, while its *position* relative to the force of gravity, governs the ability of the ship to remain off the ground in stable flight, (L, Fig. No. 86).

Our third consideration is *thrust*, the force which drives the airplane through the air and causes the wings to lift. This force acts parallel to the axis of the propeller shaft at the center of the propeller hub, (T, Fig. No. 86). The action of this force pulling the airplane through the air, in turn causes our fourth force to act upon the machine. It is *resistance* (R, Fig. No. 86), which is always equal and opposite in action to *Thrust* (T) when the airplane is in normal, horizontal flight. Sometimes, however, the airplane is not moving through the air in a direction parallel to the line of thrust. During such intervals the resistance is always equal and opposite to the component of the thrust which acts parallel to the direction of motion or line of flight, (M, Fig. No. 87). The total resistance of the airplane may act on a line above or below the line of thrust, (R. or R′, Fig's. No. 86, 87), depending upon the shape of the airplane and its relative disposition of parts, such as the wings, the landing gear, fuselage tail surfaces and other parts which cause resistance to forward motion.

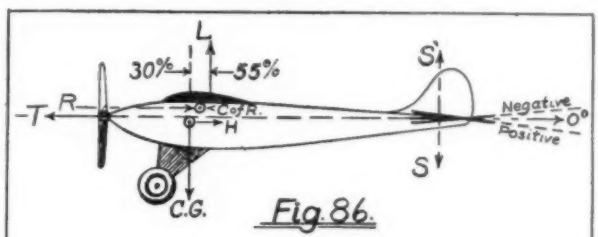


Fig. 86.

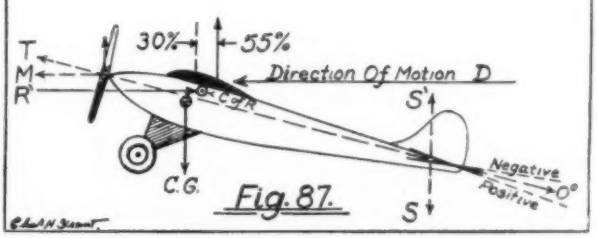


Fig. 87.

The fifth force which enters our problem of longitudinal stability is *the pressure on the stabilizer*. This force may act downward on the stabilizer as (S, Fig. No. 86) when the stabilizer is set at a negative angle, or upward as (S′) when it is set at a positive angle. When the stabilizer is set at zero, parallel to the line of thrust and the plane is in normal flight position, the upward and downward pressures are equal.

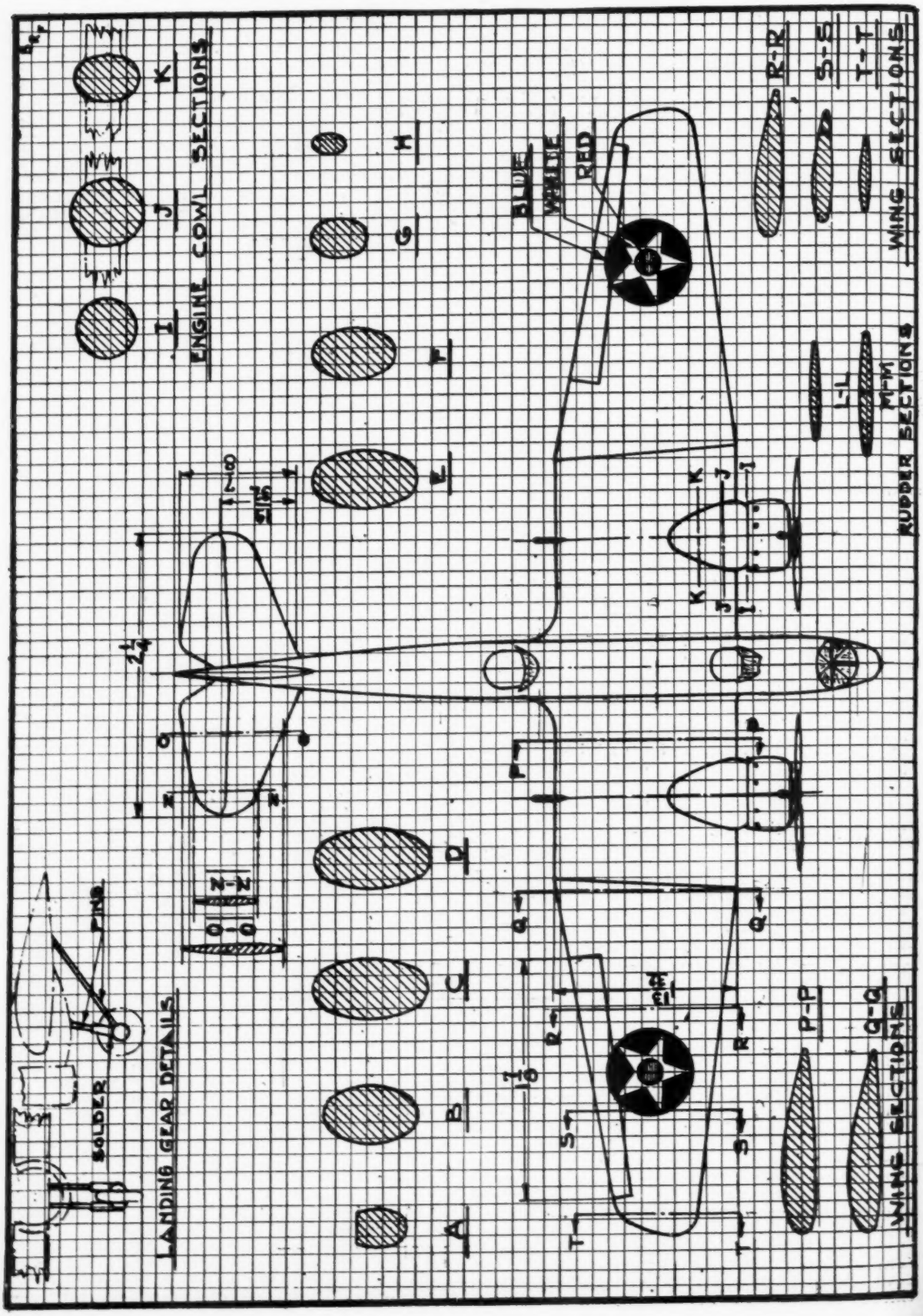
A casual reader would probably say: "all that is required now to insure longitudinal stability in any plane is to place these *forces* in a position which would give perfect balance." The *airplane* then would be in perfect flight balance. However, it is sad but true that the forces are not constant in value or in the position and direction in which they act. *They are continually changing* with any slight change in the attitude or speed of the plane while it is flying. This complicates the problem tremendously, yet within this fact lies the solution of our problem.

If the ship stalls or is forced out of the normal flight position, most of our forces change. Now, if we can design our planes and have our forces in such positions that they act relative to one another to correct the displacement and bring the plane back again into proper flight attitude, we have accomplished what is desired: our airplane will be stable. In other words, the secret of the problem of stability lies in *the most effective arrangement* of these forces acting on our airplane.

Before we can arrange our forces intelligently, however, we must know something of their characteristics, how, where and with how much intensity they act. Some of them act at the same point all of the time but change in intensity. Others are such that both the points at which they act and their intensity change continually. It is a very puzzling problem if you do not give it careful consideration and is a good substitute for crossword puzzles. Unquestionably it is more useful and enlightening.

Let us now consider the action of each one of these forces under the various con-

(Continued on page 40)


ENGINE COWL SECTIONS
K
J
I
H
G
F
E
D
C
B
A
LANDING GEAR DETAILS
SOLDER
PINS
N-N
O-O
BLUE
WHITE
RED
R-R
S-S
T-T
WING SECTIONS
RUDDER SECTIONS
M-M
L-L
P-P
Q-Q
WING SECTIONS

Build the Martin Bomber

The Martin Bomber carries 2000 lbs. of bombs at 200 m.p.h. or more

How You Can Build a Solid Scale Model of the World's Greatest Bombing Plane From Drawings That Enable You to Enlarge the Scale Conveniently

By BARNETT FEINBERG

IN BUILDING up the strength of our air forces, it is imperative to have the latest in flying equipment. For this purpose we endeavor to show one of the finest additions to the air fleet of the U. S. A., the new Martin Bomber. It is the last word in bombers and may well be called a flying fortress.

Specifications

This ship is a streamlined, all-metal, twin-engined monoplane bomber, with bomb capacity of 1200 to 2500 lbs. It has a wing span of 70′ 6″, overall length of 44′, wing chord of 11′ 3″, overall height of 16′ 4″. The speed maximum is 225 m.p.h. The landing gear is retractable. The power plant is two geared Wright Cyclones (F). The performance is similar to the best standard pursuit types.

Scale Replica Model

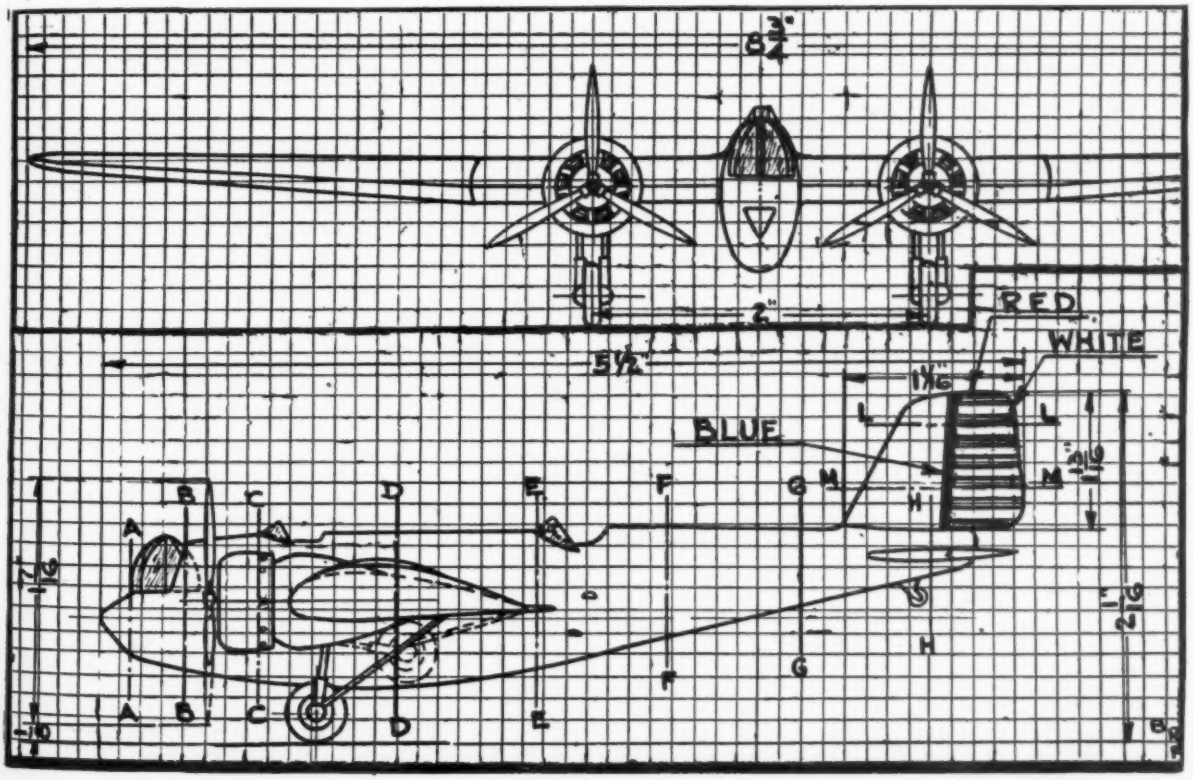
In building this model from the plans it is suggested you make it of solid balsa wood or white pine. A very neat and beautiful scale model can be made with a little care and skill.

The drawings are laid out on a squared background which allows the model builder to enlarge the scale of the drawing and build a larger model accurately.

In making a larger scale model it is necessary to enlarge the squares to the desired scale and draw the plans on these enlarged squares by making the points or the squares where the lines should cross, then draw in the lines through these points.

The following should be observed carefully in construct-

(Continued on page 47)



Effective February 1st, 1934

CLEVELAND MODEL & SUPPLY CO., INC.

DISCONTINUES SELLING TO DEALERS

thereby making possible sensational

PRICE REDUCTIONS

on all Kits and Supplies

on all Kits and Supplies

NOW EVERYONE CAN AFFORD THE FINEST MODELS BY DEALING DIRECT WITH US

This is a step we have considered for the last 3 years in fairness to the thousands of sincere modelbuilders everywhere who are vitally interested in building real authentic scale flying models made of the best available supplies.

We have made every honest effort to cooperate with dealers, but find, with some splendid exceptions (and our hat is off to them) that most of these dealers have been neither fair to themselves, to modelbuilders, nor to us. Many of them have failed miserably in cooperating with Cleveland enthusiasts by neglecting to give proper attention to demands for C-D Kits and Supplies possibly because of the large variety of items—some have even gone so far as to use Cleveland kits as bait to practice that cheapest of all trade stigmas—substitution. After all, our main interest today as always, is in supplying ardent modelbuilders with the best, and we feel, after giving dealer channels a fair trial, by dealing direct, we can not only assure modelbuilders of a constantly complete stock, prompt, intelligent and courteous service, but considerably lower prices than would be possible in going through an intermediate party—your local dealer. We shall soon have literature to simplify your ordering.

HERE IS A SAMPLE OF THESE NEW LOW PRICES!

Howard Racer and Lincoln Sportplane, 98c each; Buhl Bull-Pup, $1.25; Curtis F9C-2, Boeing P26, and Great Lakes Sport Trainer, $1.75 each; Waco and Berliner-Joyce, $2.75 each; Boeing 247, $4.95 (247's express charges collect). No C. O. D.'s accepted.

Therefore, if you're not on our mailing list, be sure, before you spend another cent on Kits or Supplies, to get our latest catalog with drastic price reductions on all C-D Kits and practically all Cleveland supplies. Send 3c stamp **at once.**

Another Sensational Value—the Superdetailed Vought Corsair V65, only $2.95—Think of It!

Surprise after Surprise in Issue No. 7 of the Bigger and Better CLEVELAND MODELMAKING NEWS

The 7th issue of this wonderful new "CLEVELAND MODEL-MAKING NEWS & Practical Hobbies" just about fully prepared at the time this magazine goes to press, contains things even more wonderful than we may have led you to believe through these columns in the February issue. For this, that wonderful new Vought Corsair ¾ scale model cannot be too highly recommended for a beautiful Navy model that you could build. Its drawing is large and well detailed. Then for beginners and those who wish to incorporate refinements in the design of an already existing airplane, we have reproduced to ¾" scale the 1931 Tilbury-Fundy "Flash"—the airplane with the smallest wing area ever attempted anywhere in the world—only 31 square feet. Try your skill at designing a stable flying model, using it as a basic design, by increasing wing area, or tail areas, lengthening the fuselage, streamlining it differently, adding dihedral, or whatever you think best as a designing model engineer. Again something new by Cleveland! Then too, we must tell you about the beautiful Lockheed Sirius ⅜" scale flying Pontoon model just like Lindbergh flew on his long trip. A striking contrast in size, yet 100% as beautiful as any of the ¾" scale C-D's.

Practically all aeronautical enthusiasts are interested in the new Union Pacific streamline train. There is also included an article showing how to build it. You'll go wild about it even though you say you "only like airplanes." In addition to all these things, you might also recall that the ¾" Packard Phaeton drawings are to be included as are the ¾" drawings for the Elephant and Howdah, numerous ⅛" and 3 16" scale airplanes, a wonderful shell racing boat, a working model cannon, numerous notes, etc., etc., etc.

To cover all this great engineering cost, preparing and editing this publication—which really is a sectional text book and not a magazine—but, of course, being in sections it resembles a magazine—the price is 40c a copy or $1.50 for the issues from No. 7 to 10 inclusive, published seasonally Winter, Spring, Summer and Autumn. Only a limited number to be printed. Make sure you send through your subscription or 40c (no stamps) for a sample copy if you are sceptical as to what it might contain, so that we print enough to cover all the inquiries, for now it becomes a case of first come, first served, for the few extra numbers to be published.

NOTE:—All back issues of CLEVELAND MODEL-MAKING NEWS available in complete sets. A few of the numbers almost sold out, but they still may be had at 25c per copy for fill-ins (except No. 3, obtainable only in complete sets—but reprints of both drawings included in that issue may be had at the rate of 25c for both sheets containing five drawings). All 6 issues mailed postfree for $1.50. Foreign customers add 5c per issue.

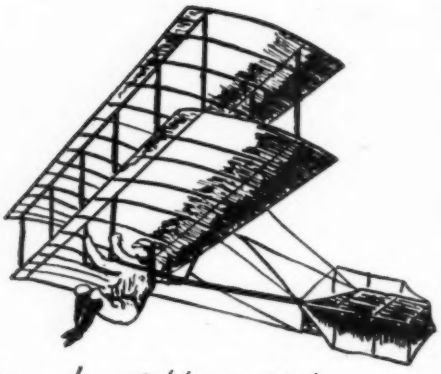
Subscribe Today! $1.50 for Nos. 1-6, $1.50 for Nos. 7-10

Send 3c stamp for complete folder illustrating the world's most authentic model airplanes and many other Cee-Dee's, as well as the finest supplies at low prices—you can't afford to be without them. Prices subject to change without notice.

CLEVELAND MODEL & SUPPLY CO., INC.

1866N3 West 57th Street — *Dependable Quality* C-D *Prompt Personal Service* — Cleveland, Ohio, U. S. A.

How The Aeroplane Was Created



Chanute Biplane Glider

What Langley Did, and How the Glider Contributed the Missing Link to Successful Flight by Man

By DAVID COOPER

PART No. 3

PERHAPS the two most famous early attempts to solve the problems of mechanical flight were made by Professor Samuel P. Langley and Sir Hiram S. Maxim. Both conceived their ideas and developed them about the same time (1889-1890) and within five years had transferred their ideas into practical models and full sized flying machines.

Langley was able, due to his position as secretary of the Smithsonian Institute, to employ a large staff of highly trained mechanics. His efforts began with the construction of models; many of these were made and flown in the lecture hall of the Institution. Practically all were of the rigid supporting surface type driven by propellers or screws, constructed as lightly as possible, yet very strong due to his method of bracing. Aluminum was used extensively.

Though these preliminaries were conducted in 1889 his steam-driven models did not appear until 1893. In May of 1896 one of his models, steam-driven, flew for a distance of fully half a mile on the Potomac River, the longest flight recorded up to this time.

His first steam aerodrome, out of the model class, had two large supporting surfaces of the type advocated by Henson. Built of aluminum steel, the body shaped like a mackerel, it was fifteen feet long and had a span of forty feet with a chord of forty-two inches, arranged so that the wings could be tilted about an axis for adjustment. It was extremely well braced and quite strong. Its propellers, two in number, protruded from the stern, ship fashion. They were adjustable for steering and made 1700 revolutions per minute. This machine was intended for passenger carrying and was built also with an eye to its adaptability for war purposes. It was made to order for the U. S. government which granted $50,000 for the project.

His next model, still larger as illustrated, was operated from a track atop a house boat in the Potomac River. At the first trial, October 7, 1903, the front end was caught and the machine catapulted into the water. It was found that the front wing had buckled from the impact, but that the rear one was intact. Later, December 8, 1903, on the second and last attempt, disaster again overtook the aerodrome and this time the rear of the machine caught in the launching car and was thrown into the water. In the attempt to salvage the machine, it was further damaged to an extent which precluded further experiment at that time. Subsequently, lack of funds caused additional trials to be abandoned. With this climax and his ambition abruptly frustrated, poor Langley died a broken-hearted man, in 1906, not knowing that before many years had passed, his work would be vindicated by a glorious flight in this same machine under the direction of Glenn Curtiss in 1914 at Hammondsport.

Langley, besides his thorough experiments and investigations shown here, also designed a whirling table, forerunner of the modern wind tunnel. He also conducted many experiments on the effects of various angles of wing incidences and different types of propellers, all of great value in laying the real corner-stone of the science of aerodynamics.

Simultaneously, Sir Hiram Maxim was conducting his famous experiments in England. From tethered models in a crude form of wind tunnel, he finally in 1889, proceeded to patent certain specifications with thirty-five new claims among which was a laminated propeller. His great effort came in 1894 with the construction of his aerodrome of gargantuan dimensions. It was 104 feet long and its main wing, 4 feet wide and 145 feet long, was covered with silk. The whole lifting surface contained a total area of 5,500 square feet. It was constructed of hollow steel tubing which acted as a condenser for the 363 horse power, steam engine employed. It was driven by two propellers, each nearly eighteen feet in diameter. With full load and complement of three men as crew, its weight was close to four tons. It was equipped railroad fashion, with four flanged wheels which ran along a track. The track afforded a straight run of 1800 ft.

At Bexley, Kent, England in 1894 the great test took place. After running half the distance of the track the rear axle became free, lifting the machine though it was intended not to be a free flight, but only to check its lifting power. Finally before the run was completed, the rails were torn up badly; not, however, without indications which showed that the plane had exerted enormous lift to the extent of twenty-five pounds per square foot of surface and five pounds thrust. Evidently the propellers should have been larger as much energy was lost in propeller slip.

The machine crashed through its barrier and was badly damaged. Maxim, unable to continue his expensive experiments and lacking any official recognition or assistance, gave up the work in lieu of his other labors as an inventor. Thus, Maxim like Langley narrowly missed fame as the

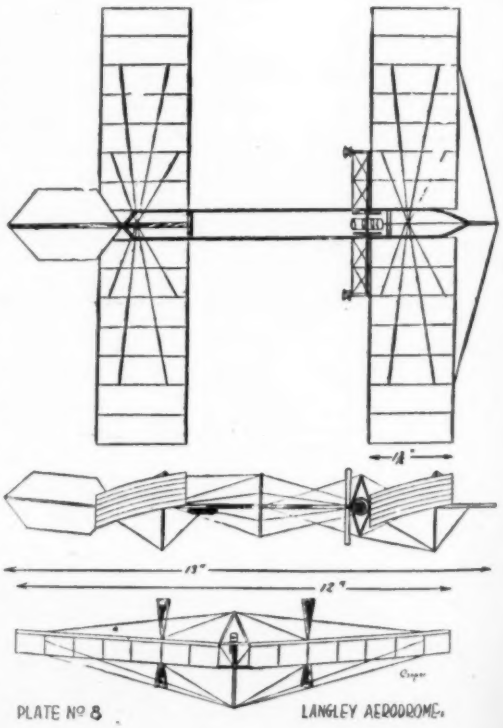
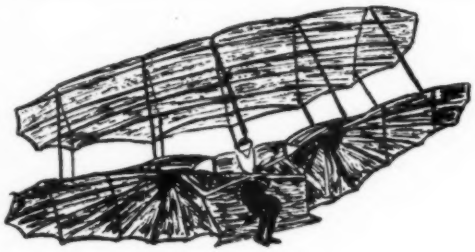
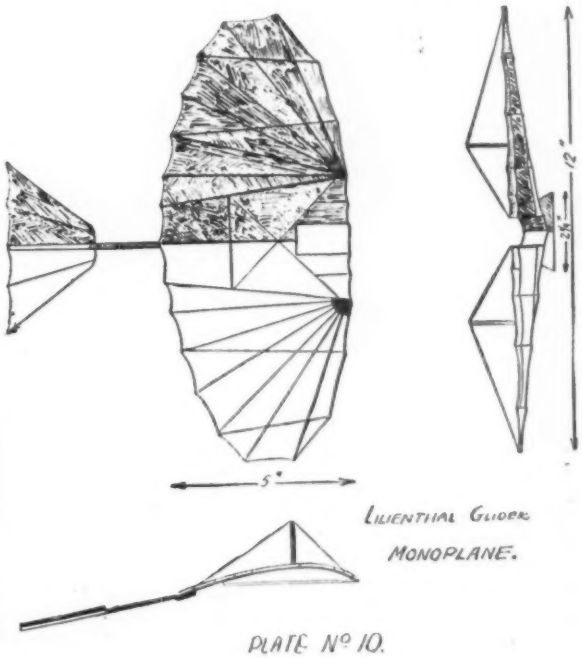


PLATE Nº 8 LANGLEY AERODROME.



LILIENTHAL'S GLIDER.

BIPLANE



LILIENTHAL GLIDER MONOPLANE.

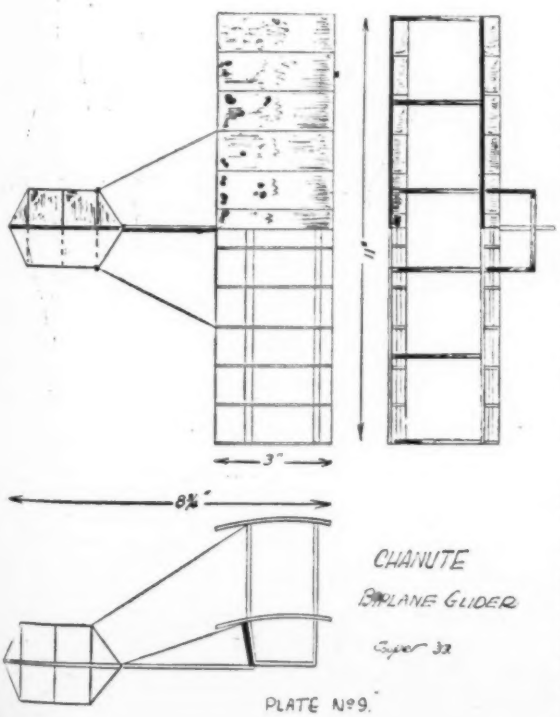
PLATE Nº 10.

inventor of the first passenger-carrying aeroplane; but their work was not without point, since their trail blazing undoubtedly led to direct success by the Wrights.

Now let us stop here and note the transition that takes place at this moment in aviation history. Chronologically, we have recorded all efforts, with the necessary repetitions, and also the sudden spurt of new ideas which have taken place. Without exception almost, efforts were made to fly the device with such stabilizing devices incorporated as were available. There is found then, a group who put their belief and faith in the theory that man should learn to fly and to control the stability of the machine by his own manual operation of controls, whereas in contrast, their predecessors gave thought only to getting the machines into the air. After that, they were to fly and control themselves by means of inherent qualities of design.

This seemed highly dangerous to no less an authority than Alexander Graham Bell, inventor of the telephone and student of aerodynamics, who had conducted many experiments and wrote treatises on the subject of cellular kites with which he had worked in Nova Scotia in 1896, in the hope of finding an efficient system of lifting. Bell believed that it was best not to attempt to master the operation of such a machine while the machine was in flight.

Due credit therefore, goes to Professor Langley who had flown his machine without a pilot for a great distance in a highly satisfactory flight. Consider that this flight was made possible by the excellent design incorporated and had no devices or controls to maintain stability other than that inherent in the machine itself. Remember also that this would be a real feat even today with the greater knowledge accumulated. In fact the planes of today are not capable of such a flight.



CHANUTE BIPLANE GLIDER

PLATE Nº 9.

Charles Manley, Langley's efficient and very capable assistant who developed and built the engine for his aerodrome, must be remembered for this monumental labor. This engine was the most highly developed at that time. Manley also attempted to become the operator of the aerodrome, but this was precluded by its untimely end in the Potomac.

This group, who fostered this change, believing it impossible to build a flying machine capable of automatic flight, had as its great exponent Otto Lilienthal, a German, who had done some experimenting with ornithopters. Although he began at the early age of 14 to investigate these, it was not until 1886 that he decided that the glider was the means by which successful flight was to be attained. Lilienthal realized, that to achieve this, it was necessary for the machine to be controlled by a pilot within. He did not believe that it was practical to construct such a device so aerodynamically perfect that it should require no attention from its occupant.

He therefore set himself to the problem of learning how to fly. He developed an original type of glider which was at once successful and soon became proficient in the art of gliding. His were the hanging types, the body being supported by a pair of bars just under the armpits so that sufficient leverage was secured by the arms for pivoting and shifting. Flight was achieved by running forward into the wind or jumping from a promenade or cliff, depending upon the rising currents to lift the machine and give sustained flight.

He also turned his attention to aerodynamic study and followed this course until 1892. Lilienthal deserves credit for practically proving the superiority of curved over flat surfaces though Cayley had done so earlier, theoretically. Lilienthal made over two thousand flights and reduced gliding flights from experiment to regular practice.

He believed that man's ability to fly and control an airplane came before the application of power to flight, and by 1896 decided that the glider had fulfilled its purpose well in teaching him how to fly.

Over one hundred gliders were built, of many types and designs. Many assistants learned to fly upon these gliders, all of which shows how completely Lilienthal's work was done. This work was all the more important for the vast amount of data he recorded, all of it valuable to later experimenters who did solve the problem. Lilienthal must also be credited as the first to achieve stability by the system of shifting his body to change the position of the glider. He was killed in one of his own machines while attempting a new system

(Continued on page 38)

THE NATIONAL AERONAUTIC ASSOCIATION JUNIOR MEMBERSHIP NEWS

Formation of a Junior Chapter of the N. A. A.

FOR the guidance of those who are interested in the formation of a chapter, the following suggested outline is offered. A group may use any plan or variation of the suggested plan as desired.

1. Call a meeting of those interested in the promotion and advancement of aeronautics, especially in the model plane field. Explain the aims and purposes of the N. A. A. and emphasize the local need and work for the chapter.

2. Secure signatures and addresses of at least twenty-five charter members and send to National Aeronautic Association,

Harris & Ewing Photo.

The Association's Vice-President, F. Trubee Davison, famous aviation authority and explorer, is President of the Museum of Natural History, New York.

Dupont Circle, Washington, D. C., with remittance of $5.00. If the membership of the group numbers more than fifty, compute the remittance at ten cents per member. The Association will upon request furnish an application form to facilitate your registration of names.

3. Give your local press an account of the meeting, making clear the purpose of the Association and the fact that the local chapter is joining a national organization endorsed by and closely affiliated with all the branches of the federal government and influential aeronautical people.

4. Each chapter should elect a president, vice-president, secretary and treasurer and forward their names with the application for charter. Also give the name of the Adviser.

SUGGESTED CONSTITUTION

(Any form is acceptable provided it does not conflict with the Constitution and By-Laws of the National Aeronautic Association.)

ARTICLE I—*Name*

The name of this Chapter shall be ..... Junior Chapter, National Aeronautic Association.

ARTICLE II—*Objects*

The objects of this Chapter are to unite into closer relationship all junior members of the N. A. A. residing in ..... and to promote all branches of aviation, particularly model aviation.

ARTICLE III—*Membership*

Any person over .... years of age and under twenty-one, may become a member of this Chapter upon receiving a majority vote of the members present at a regular meeting.

ARTICLE IV—*Officers*

The officers of this Chapter shall be: President, Vice-President, Secretary, Treasurer, and Adviser. They shall be elected every year by a majority vote of the members.

ARTICLE V—*Duties of Officers*

Section 1. The president of this Chapter shall preside at all meetings, shall be ex-officio member of all committees, shall see that the secretary calls all required meetings, shall see that all reports and records required are kept correctly, and shall see that all policies and regulation of the N. A. A. are followed.

Section 2. The vice-president shall perform all the duties of the president during his absence.

Section 3. The secretary shall keep such records, call such meetings, and make such reports as may be required.

Section 4. The treasurer shall keep such record of funds received, spent, and on hand as may be approved by the officers, and shall pay only such sums as are properly authorized upon order signed by the president and secretary. He shall make a report in writing at each meeting of all funds received, spent, and on hand.

Section 5. The adviser shall assist the Chapter in all its activities in an advisory capacity. He shall be over twenty-one years of age and be able to qualify for appointment as N. A. A. Contest Director for Model Aircraft. (The adviser should be qualified by experience and inclination, should be expert in model plane work and skilled in promoting boys' activities.)

ARTICLE VI—*Committees*

The officers may name such committees as may be desirable. (Suggested committees are: Program, Entertainment, Contest, Membership, Publicity, Research, etc.)

ARTICLE VII—*Dues*

The dues of this Chapter shall be .... cents each regular meeting.

ARTICLE VIII—*Meetings*

Section 1. The Chapter shall hold a meeting every .....

Section 2. Special meetings may be ordered by the president on written request of five members.

ARTICLE IX—*Amendments*

This constitution may be altered or amended by a three-fourths vote of the members.

JOIN the N. A. A. as a junior member interested in models and enjoy the benefits of membership in a real national organization with the satisfaction of knowing you are working side by side with the nation's leaders in aviation activities. This association has for its purpose the encouragement and advancement of aeronautics and the determination to keep America "first in the air." Only members of the Association are eligible to compete for N.A.A. model plane trophies and to have their record making model plane flights recognized officially by the Contest Committee. As the representative in the United States of the Federation Aeronautique Internationale, the Association has as a special responsibility the encouragement and regulation of air meets, races, and record trials.

Membership Applications Rush Headquarters

The applications for junior membership are coming in such numbers that it is increasingly difficult to get the new members' pins and membership cards out at once. Those who are experiencing a delay in receiving their credentials are asked to be patient with the assurance that headquarters is working full speed and will soon get the situation under control.

Eastern States Indoor Meet

The urge to attend a model flying contest is something that model enthusiasts alone can fully appreciate. Automobile loads of entrants came through sub-zero temperatures and a blizzard, from Springfield, Mass., Boston, Philadelphia, Atlantic City and way points to attend the 1933 Eastern States Indoor Meet held December 28 under the sponsorship of Universal Model Airplane News. The meet was sanctioned by the N. A. A. and attracted seventy-one entrants who did some exceptionally fine model flying despite unfavorable atmospheric conditions. The cold roof of the 165th Regiment Armory, where the meet was held, threw down a constant draft of turbulent air currents that made new records impossible.

Edward Beshar, Tuckahoe, N. Y., finished first in the hand-launched stick model contest with a flight of 10 minutes 28 3/5 seconds and won the Universal Model Airplane News Trophy.

The Baby R. O. G. event went to Herbert Greenberg of Newark, New Jersey, when his model flew 6 minutes 44 1/5 seconds. For this flight Greenberg was awarded the Whitfield Paper Works Cup. Alfred Bogush, Springfield, Mass., flew his fuselage R. O. G. model 5 minutes 55 2/5 seconds to win the cup offered by the Balsa Wood Company.

"Peter" Andrews of Philadelphia was high point score winner and was awarded the Comet Model Airplane Company Cup, and a kit of tools and model supplies offered by Broadfield Model Airplane Company, Hempstead, N. Y.

Changes in N. A. A. Rules Suggested

The Contest Committee has received numerous suggestions for changes in the Model Definitions and Competition Rules. The general belief is that there are too many classes and categories for model planes. The most frequently offered suggestion is that indoor classes and outdoor classes be reduced to three each in accordance with their wing area. Members are asked to write to the Model Plane Committee at once giving their ideas. Address your letters to N. A. A. headquarters, Dupont Circle, Washington, D. C.

1934 National Championship Meet

At the 1934 National Championship Model Plane Meet to be held in Akron, Ohio, June 27-29, several entries have been assured from England, Canada and Australia, in the Moffett International Contest. This contest will be for fuselage type, outdoor models with wing area between 100 and 200 square inches. Since the weight rule, one ounce of weight to each 50 square inches of wing area, has been adopted in those countries as well as in the United States, this year's Moffett Contest may possibly have the weight rule provision included in its rules. Only six entrants from any country are permitted to compete in the Moffet event and those countries which are too far distant to send representatives may have their models flown by proxy. Canadian and American entries will be given elimination tests at Akron, during the meet. Foreign entrants are permitted to compete in all seven events of the meet, but only in the Moffett Contest are they allowed to have their models flown by proxy.

Only Members Eligible

ONLY members of the National Aeronautic Association are entitled to the benefits of membership. Model builders and flyers should join the Association as junior members so that their record making flights may be given official recognition. N.A.A. trophies and awards for contests are established to encourage and promote contest activities among members. The more junior members, the more the N.A.A. will be able to do for model aeronautics. So make out your application for membership and forward it now. There are many things planned for your benefit which are possible only with a large membership.

It should be considered that group membership costs less but brings the same benefits as individual membership. It is easier for the Association to administer junior membership in clubs and groups than it is to handle thousands of individual members. Wherever possible therefore, it is suggested that model enthusiasts join the Association in the group membership plan.

1934 Gordon-Bennett Balloon Race September 23

The Aero Club of Poland has fixed September 23 as the date for the 1934 Gordon-Bennett Balloon Race. The start probably will be from Poznan.

Three balloons may be entered from each country and first of the seven prizes will be 10,000 zlotys (approximately $1,850). Poland's victory in the race at Chicago last September gave her the right to organize the next contest, which will be the second for the Fourth Gordon-Bennett Trophy.

World Recognition Given Settle's Flight

Soaring upward from Akron Airport on the morning of November 20, Lieut. Comdr. T. G. W. Settle, U. S. N., hero of many balloon races, with Major C. L. Fordney, U. S. M. C., began an ascent which was not to terminate until they had risen farther from the earth than any other person in the Western Hemisphere.

Ray Cooper, general manager of the N. A. A., and William R. Enyart secretary of the Contest Committee, took off from Washington by plane when word was received of Settle's start and were able to follow until sundown the shining silver stratosphere bag as it drifted eastward.

Cooper and Enyart, searching by plane early next morning were among the first to reach the intrepid balloonists in a salt marsh beside their equipment.

Due to special arrangements, the Contest Committee was able to announce the official results of the flight 48 hours after the balloon had been located. The Bureau of Standards calibration disclosed that the balloon had penetrated to an altitude of 61,237 feet, 11.59 miles.

At the time of Commander Settle's flight no official report had been made to the Federation Aeronautique Internationale on the performance of the Russian pilots who made a stratosphere flight several months ago, news reports of which had indicated they had reached a height of 66,000 feet. Russia is not now represented in the F. A. I. and in view of this the Contest Committee has forwarded to the F. A. I. the official report for Commander Settle in anticipation of acceptance as the world altitude record. As we go to press news reports from Paris indicate Settle's flight has been accepted by the F. A. I. as the world's official altitude record.

CLUB ACTIVITIES

Fresno Juniors Have Interesting Programs

THE Junior Division of the Fresno, California, Chapter have the distinction of being just about the first junior membership club to become an active unit in the N.A.A. Virgil B. Weidner, President of the club, writes of the club's formation and activities, "In order to begin the work of organization, I secured two of my interested friends who are now Vice-President and Secretary to help. We explained our plan to Mayor Leymel who is President of the Fresno Chapter, N.A.A. He was very much in favor and encouraged us. We next made arrangements with the City Superintendent of Schools for issuing bulletins and secured permission to have any of the teaching staff as lecturers in the event we desire them.

Officers of Fresno Club

Reading left to right: Wm. Short, Vice-President; Virgil Weidner, President; Morris Boguchwal, Sec't'y; Jack Khantamour, former editor of the Prop-Wash.

"The first meeting was held with eight persons present, six of whom became members. We have since secured twenty-seven members.

"As to our activities, there are many. We have a Committee on Junior Activity and Model Building which encourages members to build model planes. This committee also maintains a supply shop from which members may purchase all kinds of model materials at low cost and they also receive the best of materials. We are able to do this through an arrangement with one of the model supply firms. This committee will direct the Second Annual N.A.A. Model Airplane Meet to be held at our local airport next April.

"The object of our junior association as set forth in our constitution is to encourage and promote aeronautics in the United States; to encourage members of the younger generation to become interested in the development of aeronautics. We are accomplishing this goal steadily, we believe.

"We also have debates at many of our meetings. For example, the present topic is, 'Is the monoplane more practical than the bi-plane?' This has proved to be a very good form of educational entertainment. we seem to have some good debaters, too.

"Our Program Committee arranges fine programs. We have lecturers who are usually members of the aviation profession. Representatives of the local air lines appear often before the group. We also have motion pictures shown by various air colleges and preparatory schools. It is not difficult to secure this form of entertainment, nor is it hard to secure new members. All American boys seem interested in aviation.

"We have a special airway radio class conducted by one of our members who is a radio student.

"We feel that we are doing something that is really furthering aeronautics. Such groups are necessary and we are for the establishment of them."

The Fresno Junior Division has its headquarters at the Hotel Fresno, sharing space with the adult chapter. It is interesting to note that the junior organization has its own club stationery.

Asheville Juniors Four Hundred Strong

THE Asheville Model Airplane Association of Asheville, North Carolina, has just been organized with a group of charter members made up of the most experienced flying model builders to arrange the details and make way for the four hundred enthusiasts who wish to benefit by an association.

Mr. Alan D. Booton, who has been appointed an official N.A.A. Contest Director for Model Aircraft, is the club leader and adviser. This club is fortunate to have the help and guidance of this gentleman with his many years of model experience.

The Asheville Chamber of Commerce is supporting the club's activities but not its finances. The club has secured headquarters facilities from the County authorities.

Record Holders Receive Certificates of Record

Holders of model plane records which have been officially recognized by the Contest Committee of the N. A. A. up to the end of 1933, have been mailed Certificates of Record showing in what class and category the records have been made. These certificates are beautifully engraved documents and are suitable for framing. They make fine additions to collections of trophies and cups. The Association is adhering strictly to the policy, beginning with January 1, 1934, of giving consideration only to record flights made by members.

GLIDING

Loop Record Set at Akron Meet

AKRON Airport on October 15 was the scene of an air meet devoted entirely to gliders and model aircraft. Seven gliders and 21 glider pilots participated. The success of the event was due in great measure to the N. A. A. officials who supervised it and to the members of the Akron Chapters of the Association.

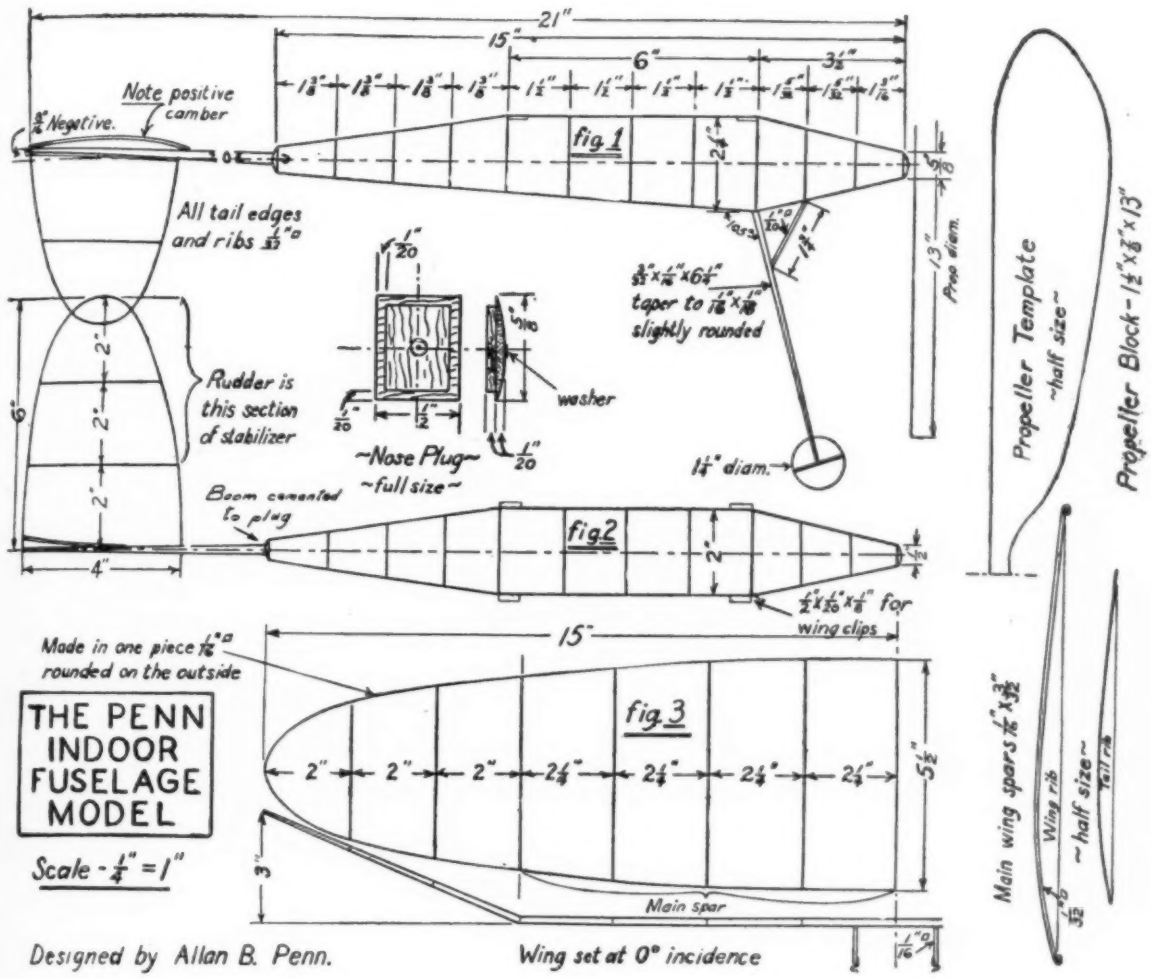
A feature event was a looping exhibition by Willys Sperry and E. B. Sutherland. Airplane-towed by a Fairchild 71 and William Hudson at the stick, they took off together in fan formation, reached an altitude of 10,000 feet within an hour. After cutting loose they separated till about 1,000 feet apart and immediately began looping. Both pilots surpassed their own previous records. Official N. A. A. observers, stationed at the meteorological observation tower on the airport terminal building, with the odolites and binoculars counted 68 consecutive loops by Sperry and 63 by Sutherland.

Mrs. William A. Moffett, the Admiral's widow, presenting the Rear Admiral William A. Moffett Memorial Trophy to Maxwell Bassett of Philadelphia, 1933 winner.

Since looping of gliders has become an increasingly popular demonstration and has resulted in a growing sentiment toward official recognition, the N. A. A. Contest Committee recently established record categories of this character, and Sperry's mark of 68 loops is regarded as the present official record.

A combination bomb dropping and spot landing contest was enjoyed by pilots and spectators alike. From an altitude of at least 200 feet each competitor dropped a flour bomb as near to the landing mark as possible and then attempted to land at the mark.

THE PENN FUSELAGE MODEL



CONSTRUCTION NOTES

Allan B. Penn of New York City, holder of the world record for indoor fuselage type models, has made plans of his record making model for the benefit of those who are wondering how an indoor fuselage model can fly for more than ten minutes. He flew his model 10 minutes 05 seconds in an official meet on September 9, 1933.

With his drawing of the model, Penn offers the following construction notes and hints:

1. The fuselage longerons are 1/20 inch square. The front and rear fuselage struts are 1/20" x 3/32" to withstand the strain of the plugs. All other struts are 1/20" sq.

2. The front and rear plugs are the same size. The drawing shows the front plug. Instead of a washer, a rear hook of .014 music wire is cemented into the center of the rear plug for the "S" hook.

3. Wheels are made from a piece of celluloid 1/32" wide cut from a photographic film and bent into a circle of 1¼ inch diameter. The ends are cemented together and a piece of 1/20" sq. balsa is cemented through the diameter. Drill through the center of this piece to accommodate the axle which is a small piece of .010 wire. To keep the wheel from wobbling, a thin tube made from 1/64" balsa rolled around a pin is glued on one side of the axle hole.

4. Wing clips may be fastened to the side of the fuselage as shown, but Penn prefers to cement the four wing struts directly to the fuselage, thus saving the weight of the .010 wire clips and the saddles for the clips. Slight variations in the negative incidence of the stabilizer afford any necessary correction for stability. Since models vary in adjustment, Penn suggests that the struts be not cemented in place until the correct position is closely determined.

5. As shown in Fig. 2, the ship is made to turn to the left. The fin is below and has the same camber as the stabilizer. One end of the last rib of the fin is fastened to the tail boom while the other end is cemented to the elevator edge.

6. It should be noted that the fin is formed around the same template as half the elevator but is shorter by one inch. Fig. 2 shows this.

7. The edges of the tail surfaces and of the dihedral wing tip portions of the wing are made around a template. Cut a cardboard pattern and bend a soaked piece of balsa round the edge. Hold over hot stove until the wood is dry. The outline of the tail surfaces is made of 1/32" sq. balsa. The wing tips are made of 1/16" sq.

8. The fuselage is covered with superfine tissue which is water-sprayed to shrink it. An atomizer serves well for spraying.

9. The wing and tail surfaces are covered with microfilm. It is easier to cover the wing if made in four sections; the middle flat section in two parts, and the two dihedral tips.

10. The plugs are made of two flat pieces of 1/20" balsa cemented cross-grain. Be careful to have the grain run in the same direction as shown in the drawing, or the sides will split off when being inserted.

11. The tread is 7½ inches between wheels.

12. The tail boom is 6 inches long, hollow tear-drop shape. Before bending the 1/64 inch balsa measures ⅝ inch, tapering to ¼ inch.

13. Penn winds his rubber motor outside the fuselage and then draws it through with a steel rod, hooked at one end. This reduces the risk of breakage and permits winding to the maximum.

14. On his record flight, Penn used two strands of 7/64" flat rubber, but the fuselage is strong enough to support ⅛" flat rubber. The model weighs .10 ounce without the motor.

Results: "Why I Like to Build Model Planes" Contest

MANY of you who carefully read the October and November issues of Universal Model Airplane News will not forget the contest with the title which appears at the head of this article, especially those who wrote letters and sent them to us. We received a great number. In order to be fair with everyone we have read all of these letters carefully, which has taken time and is the outstanding reason why we have been unable to declare the winners in a previous issue.

It is very interesting to note from the letters that most of our model airplane builders pursue this pastime because they think it is fun. Many of the young men, in writing, have forgotten that they were writing about a particular subject. Instead, they proceeded to give their experience and life history in connection with model building. There were only one or two young men who carefully analyzed their own feelings in this matter and gave the reasons why they liked to build model planes, concisely and definitely.

There was not one contestant who gave all of the reasons why a young man might like to build model planes. These reasons might be listed as follows. Of course, we cannot elaborate on them here.

1. Building model planes teaches the young man primarily to think for himself, to use his own mind and not to copy.

2. It teaches him all of the mathematical sciences, such as, algebra, geometry, trigonometry, physics, chemistry, and sometimes calculus. All of these sciences may be applied to model design and construction. Incidentally, he will learn something about meteorology and strength of materials, as well as general engineering practices. One of the most important things he will learn to master is mechanical drawing. This helps to give him the very necessary quality of a sense of proportion; that is, being able to give things their proper values and put them in their proper place.

3. This hobby teaches him to use his hands in coordination with his mind.

4. It builds up his body, for it is required of any model builder that he experiment to a large extent out of doors. This involves great activity in following planes that have flown a great distance. Even a short distance will help start a sluggish circulation.

5. It teaches him to compete with other young men in the art of sportsmanship. He makes social contacts of great value. He learns to handle himself in competition with others. This is most important and is a quality lacking in many, especially those who have been cursed with too many riches and have been prone to hold themselves aloof from the "rabble," so called. Model airplane building and flying seems to have a great leveling effect. All are working for a common end on the same level regardless of silk or social standing.

6. One other great quality is developed by this hobby. It teaches all those who follow it to act for themselves, to take the initiative, to undertake research in which they are bound to learn something of history in general and aviation in particular. It provides a very necessary medium of self-expression. This medium, under our educational system today, is generally lacking. A young man has a chance to express his own knowledge and his own thoughts and not merely repeat the knowledge of others which he has been taught to recite.

It is possible to elaborate greatly upon the foregoing reasons; why any one would like to build model airplanes. However, I am sure that many are interested to learn who the winners are. Five of Mr. Edwin T. Hamilton's "Complete Model Aircraft Manual" were given to the winners who are as follows:

Denton Stockton of 442 Arvis St., Highland Park, Bakersfield, Calif.

George De Consta of 339 E. 9th St., Brooklyn, N. Y.

J. C. Warren of 19053-8th N.W., Seattle, Wash.

Nick Stashuk of Box 138, Eureka, Calif.

Cedric E. Galloway of 610 S. 4th St., Austin, Minn.

We hope this little contest and this short article will help to stimulate model building readers and that more serious thought will be given to using it as a means of education in general and in aeronautics in particular, for there is nothing that will prepare one more fully for a career in aviation than the pursuit of this great hobby.

Who Was Who at the Eastern States Contest

THE expert model builders had a great "get together" party at the recent Eastern States Model Airplane Contest held at the 165th Regiment Armory, New York, on December 28, 1933. Contestants gathered there from points ranging along the Atlantic seaboard from Boston to Atlantic City.

The Boston delegation arrived under the leadership of Willis Brown. The group included John Bartol, present indoor endurance record holder, and Wilbur Tyler, who placed second to him in the National Contest in June. From Westfield, Mass., came Barbara Maschin, the only girl in the contest. She and her brother drove all night through the zero weather in order to take part in this contest. A large delegation came from Philadelphia under the leadership of Mr. Fritz, Mr. Streeter, Mr. Churchill and Mr. Beldon, of the Philadelphia Recreation Association. With their group came a delegation from Atlantic City. Springfield, Mass., sent two young men: Danny Clini and Alfred Bogush. They also braved the storm under the leadership of Mr. Whelan. Other delegations of contestants came from nearly every town and city surrounding New York to swell the total number of entries to 71. The group from the Bamberger Aero Club, Newark, N. J., was led by Mr. Irwin S. Polk, club director.

There were a number of very fine prizes offered for the three events, which were Duration Stick Model, Duration Fuselage, and Duration Baby R.O.G.

The armory opened at 9 o'clock and the contestants began to arrive shortly afterwards. It was nearly noon, however, before the entry list was completed; due to the severe weather and difficult traveling. After a practice period lasting until about 11:15 the contestants began to take official flights. By noon the contest was in full swing and the air was speckled with models of the various classes. The events were run off smoothly and without any hitch in the procedure, continuing until 5:45 when all flights ceased.

The same system of flying was adopted as was followed at the National Indoor Model Championships in June, 1933. There were about eight groups of boys, each one under the leadership of two timers. About seven or eight boys were in a group. When the contestants were ready for official flights the timers were notified and the time taken. Any type of model could be flown officially at any time during the contest. No special period was alloted for any particular class of flights. At 5:15 all time cards were turned in and the winners were determined.

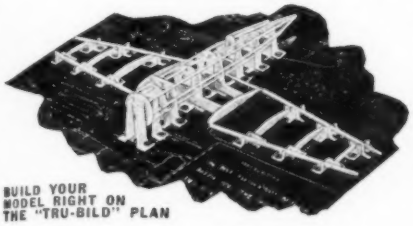
The high point winner was "Peter" Andrews of 5922 Nassau Road, Phila., Pa. He placed third in the Baby R.O.G. and fifth in the Stick Model Contest. He received a trophy donated by the Comet Model Airplane & Supply Co., Chicago, Ill. Many model fliers remember the Comet Co. for the fine flying scale models that they turn out. Andrews also received as a second part of his reward a handsome kit of supplies, donated by Broadfield Model Airplane Co., Hempstead, L. I. The kit contained supplies of all types of materials necessary for model building, including some very useful tools.

The Duration Stick Model Contest was won by Edward Beshar of Seneca Ave., Tuckahoe, N. Y., with a flight of 10:28 3/5 minutes. He was awarded the Universal Model Airplane News trophy. One of these trophies is given every year for this event. Beshar always placed well up among the leaders in all the contests, but this was the first contest in which he was awarded the first place trophy. Second in this event was Lawrence Smithline of 301 W. 109th St., N. Y. City. His time was 7:39 3/5 minutes. He was awarded a gold

(Continued on page 46)

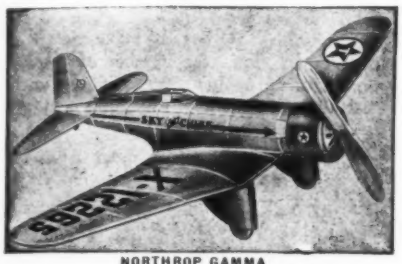
New IDEAL *Models*

you can build quicker . . . and that give you real Flying Thrills!



BUILD YOUR MODEL RIGHT ON THE "TRU-BILD" PLAN

Now you can select from four 16-inch Models in this "Tru-bild" Series; and each one will give you a new idea of how fine and accurate a good Model can be made. This patented "Tru-bild" Plan helps you make Models that are absolutely accurate to plan, without twisted bodies or wings and with every part in perfect alignment. Saves time; takes the hard tedious work out of model building. "Tru-bild" Kits contain all materials and parts for the complete Model also full-size Plan and Instructions and the patented "Tru-bild" Forming Jigs.

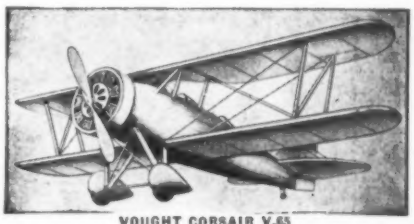


NORTHROP GAMMA
16 in. "Tru-bild" Model

Tru-bild
TRADE MARK REG U.S. PAT OFF

Kits 50c Each

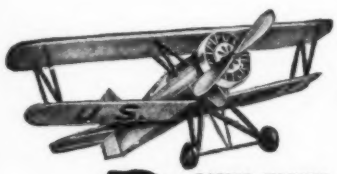
Plus 10c Postage.
(Please do not send Stamps)



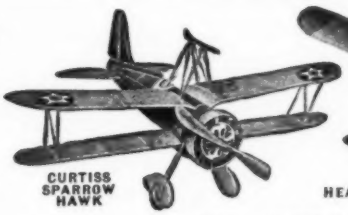
VOUGHT CORSAIR V-65
16 in. "Tru-bild" Model

CURTISS CYCLONE HAWK
16 in. "Tru-bild" Model

BELLANCA MONOPLANE
16 in. "Tru-bild" Model



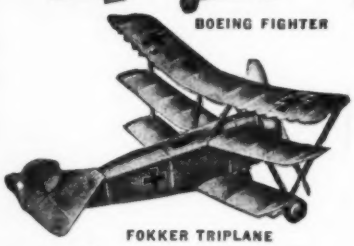
BOEING FIGHTER



CURTISS SPARROW HAWK

HEATH PARASOL

FOKKER D-VIII



FOKKER TRIPLANE

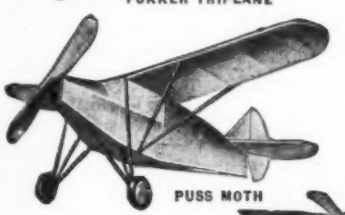
12 and 15 inch IDEAL-O-PLANE Flying Models

Your choice of these ten (10) realistic Models of the most favored planes; every one guaranteed to fly. Kits contain all parts, materials and fittings—everything to complete the Model, including full-size Plan and complete Instructions.

BRITISH S. E. 5

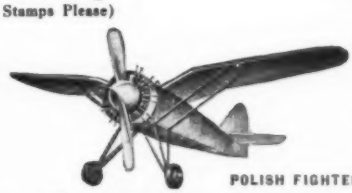
Any 2 Kits for 50c

Plus 10c Postage.
(No Stamps Please)

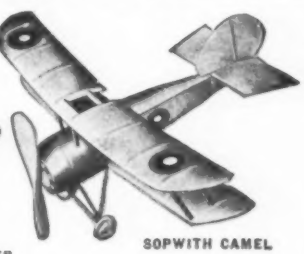


PUSS MOTH

MONOCOUPE



POLISH FIGHTER



SOPWITH CAMEL

Send Stamp for New Bulletin

Containing illustrations of all our Model Airplanes and Ship Models, also lists of needed materials and supplies.

DEALERS

You can make more money with IDEAL products. Write for details of our entire line of more than 100 Model Airplanes and Ship Models.

Lindbergh's Lockheed Sirius

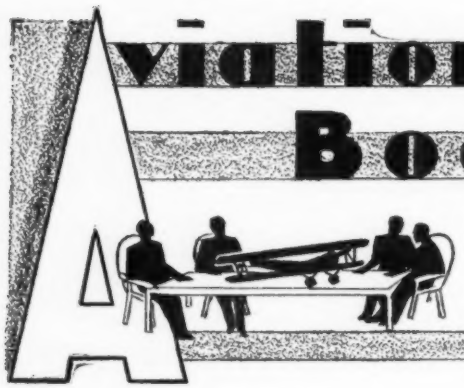
and two more fine, 15 in. Models in a Combination Kit, all for **$1.50**

Plus 15c Postage
No Stamps, Please

Here's your chance to build a dandy Model of the plane that recently completed the 30,000-mile Atlantic flight. Also the Vought Corsair and the Spad; each 15 in. size. Kit is complete with everything required for the three Models.

NRA MEMBER U.S. WE DO OUR PART

IDEAL AEROPLANE & SUPPLY CO., Inc.
20-24 WEST 19th STREET NEW YORK, N. Y.
Canadian Branch: Canadian Model Aircraft, 3007 St. Antoine St., Montreal.
Pacific Coast Branch: Model Boat & Aircraft Co., 1336 Fifth Ave., San Diego, Cal.



Aviation Advisory Board

Conducted by
CHARLES HAMPSON GRANT
Chairman of the Board
Formerly of
The Technical Section, Air Service, U. S. Army

THIS month we have some very intelligent questions from several young men. One of them is Peter Nadroski who lives at 16 W. Lake St., Easthampton, Mass. He asks the following questions:

Question: What should be the areas of the tail surfaces on a gas model if the span is 8′?

Answer: If the span is 8′ the chord of the wing should be 15″ to 16″. This would give an approximate area of 9½ sq. ft. The stabilizer under these conditions should be about 3 sq. ft. It is possible to have the gas model fly properly with less than this amount, say 2½ sq. ft., but as we have said before, the greater the stabilizer area, the greater will be the longitudinal stability of the ship. The fin of such a model should be approximately ¾ sq. ft. or 7½% of the wing area.

Question: What kind of covering is best, silk or paper?

Answer: On smaller models paper would probably do very well. However, this punctures easily and rips when subjected to severe stresses; such as might occur upon a hard landing or a collision with the ground or some other object. Silk is unquestionably better. A covering of 1/64″ balsa wood is very efficient. It also gives the plane great rigidity, and is easily repaired.

Question: What would be the best length of the fuselage?

Answer: There is no such length as the "best length of the fuselage." The best length for the fuselage would be one infinitely long. However, such a fuselage would involve too much structural weight. Therefore, we must compromise between length and aerodynamic efficiency. The length of the fuselage should be such that the distance of the wing to the tail, center to center, equals ½ the wing span. If it is made shorter than this you sacrifice longitudinal stability.

Question: What should be the area of the propeller?

Answer: The area of a propeller turned by a gasoline engine at high speed has little bearing upon wing area. The area of the propeller in such cases should be such that the engine will turn the propeller at top speed. The reason for this is that at high speed the propeller driven by a gasoline engine, is at a very low pitch. In such cases the angle of attack of the blades is always the efficient one regardless of how much area is in the propeller blades. On higher pitch propellers, too little area changes the angle of attack considerably, so that at times the propeller is operating very inefficiently. In other words do not worry about the propeller area in the case of a gas model. The important thing is to make the quantity, (pitch times the number of revolutions of the propeller), 30 to 50% greater than the speed of the plane. This quantity is called the pitch speed.

Question: Is balsa or other kinds of wood desirable?

Answer: This question, phrased as it is, is a little ambiguous. However, we will make a guess as to its meaning. Balsa should be used for all members of the structure where extreme stresses do not exist. Building a gas model requires a certain amount of stress analysis. Members which are stressed extremely should be made of hard wood. The use of thin veneer of birch in certain parts of the structure makes for strength and lightness.

These questions have been answered as we feel that they are very opportune. Judging from news disseminated from underground channels, many gas models are in the course of construction.

Here is a young man who is worrying about propellers, and rightly so. He desires information about them and their relation to an airplane, with the results he will obtain. Harold Kroll of 1883 Prospect Ave., New York City asks the following questions:

Question: Where is the greatest efficiency on the blade of a propeller?

Answer: The point of greatest efficiency is located on the blade approximately 2/3 to ¾ of the propeller radius from the propeller shaft.

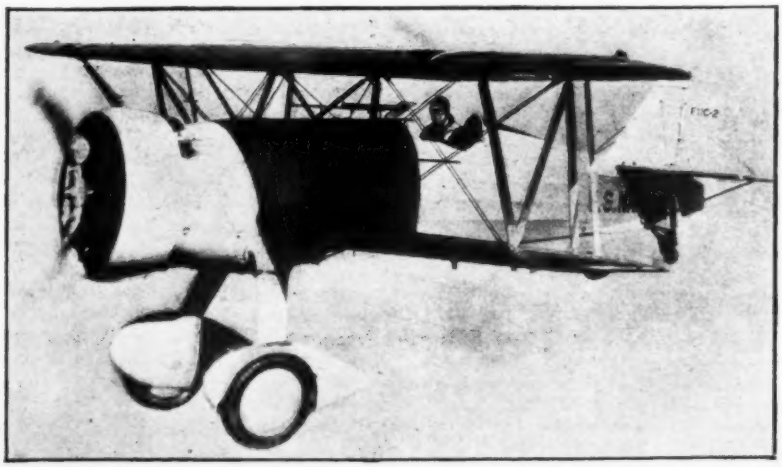
Question: Should the blade be widest at this point?

Answer: It is our opinion that the blade should be widest at this point. It is obvious that the greatest area that is placed at the point of greatest efficiency, the more effective the propeller will be.

Question: In multi-propelled airplanes, should the sum of the blade areas be 1/10 of the wing area, or what should it be?

Answer: For the average model it makes no difference whether the airplane has one propeller or two propellers, in respect to its blade area. The total amount of blade area in all propellers should be approximately 1/10 where the pitch is one and

(Continued on page 43)



A new U. S. Navy Curtiss Hawk F11C-2 powered with a nine cylinder 700 h.p. Cyclone which weighs only 1.22 lbs. per h.p.

Here's the Latest "Lindy" Sensation

"TINGMISSORTOG" From Around The World to You . . . . . .

Build This Sensational Solid Wood Replica Model!

You will shout oh boy, what a beauty! . . . when you see this solid wood exact replica of Lindbergh's history-making Tingmissortog (meaning "Big Bird"). The minutest detail of this great ship has been followed so if the Colonel himself looked upon your completed model his exacting eye would not be able to find a single fault . . . a beautiful red and black Lockheed Sirius monoplane so simple to build that any model fan can complete it and yet will meet with the entire satisfaction of the most critical model builder. A beautiful, decorative display model for the radio, bookcase or den. 15" wingspan only $1.25 complete with all accessories.

GUARANTEE If you are not fully satisfied your money will be refunded

Like all Selley quality kits, each is packed in a strong box, complete with the best selected white balsa blocks, colored dopes and cement, authentic insignia, die-cast metal propeller, wing and tail lights, special spun aluminum cowl, large full sized plans with complete building instructions.

Only $1.25 complete

SPECIAL

A specially designed heavy die-cast white metal pedestal base and fitting for mounting may be purchased, finished in black lacquer at an additional cost of 75c.

FREE PHOTO OF Col. and Mrs. Lindbergh Flying "TINGMISSORTOG"

We were fortunate in securing a limited number of beautiful photographs of Col. and Mrs. Lindbergh flying "Tingmissortog." These photos are large 5 x 7 ready for framing . . . you will be proud to own one . . . while these photos last we will include one free to those ordering a Tingmissortog kit . . . order yours TODAY and be one of the lucky ones to get in on this remarkable free photo offer.

Look at These 4 New Aces! Aren't They Beauties? Only 50c Each

All 18" wing span—only 50c each. Professionally designed and flight tested for performance . . . these large flying super-value kits represent the biggest bargain ever offered.

Add 10c Extra for Postage

STINSON RELIANT

A beautiful model of this popular cabin plane, finished in blue and orange. It is sturdy, a good flyer and a three point lander at all times.

CURTISS SWIFT XP934

The latest addition to Uncle Sam's air-fleet. Formidable looking with all machine guns, details, etc. Flights over 100 ft. are easily made with this realistic looking job.

HOWARD RACER "PETE"

The fastest light plane in the country and the trimmest model you ever saw, perfectly balanced and a long fast flyer.

BOEING TRANSPORT 247

The last word in model designing and the biggest scoop of the year for model value. Built either as a flying or a non-flying job. You will find this the most realistic and cleverest bit of model designing you ever saw.

Here's What All Selley Kits Contain

Each kit is complete with the finest knife cut, selected balsa wood.

Colored Jap Tissue, Rubber, Cement, Wing adhesive, Music wire, Printed Balsa Sheet, Special semi-finished prop, Colored authentic insignia, Full sized plans, Building instructions, Accessories.

HOW TO ORDER SPECIAL 15 DAY FREE OFFER

Order at once and receive very attractive gift on orders amounting to 25c or more. The larger your order the larger our gift. Send remittance with itemized list of models you select. Add 10c postage for each kit—15c if west of Denver.

SELLEY Mfg. Co. Inc.

Dept. 303 1377 Gates Avenue, Brooklyn, N. Y.

Selley's GUARANTEED PRIZE WINNING PARTS AND ACCESSORIES

Prize Winning Models Use Selley Parts

Postage 3c each

BOMBS, TORPEDOES

13/16"	5c
1¾"	10c
3" Torpedo	15c

PURSUIT TYPE GUNS

3/4" Long	5
1" Long	5
1 1/2" Long	5

SWIVEL TYPE GUNS

1¾" Dummy Rachet	10c
2" Double Action	15c

Postage 3c

NEW GUNS WITH RING MOUNT

1¼"	25c
1¾"	30c

Postage 3c each

COWLS SPUN ALUMINUM

Dia.	Drag Ring	Open Face	Closed Face
1"	10	15	15
1½"	18	18	18
2"	20	20	20
3"	28	28	28

Postage 6c

PROPELLERS

Dia.	Hawk 2-Bladed-3	Die-cast 2-Bladed-3	Standard 2-Bladed-3
1¼"	.. ..	.. ..	10 10
2¼"	.. ..	.. ..	15 15
3¼"	25 ..	.. ..	20 20
4"	30 35	35 25	30 30
5"	35 50	50 30	45 45

Postage 3c each

LIGHTS WING AND TAIL

Just what you want to make your model perfect. 3 lights to a set.

For 12" model	10c set
For 15" model	15c set
For 24" model	20c set
Packing and postage	3c set

FOR YOUR MODEL AIRPORT

Anti-aircraft Guns	25c
Dummy Flood Light	25c

Postage 3c

DEALERS — JOBBERS—AGENTS—write for discounts and proposition, exclusive territory granted. Colored window display, posters, banners and counter cards.

ARMY PHOTOS 2½"x4½" Set of 24 Army Planes on Bristle board 25c

SQUADRON INSIGNIA 84 in pairs, all different 25c

BOOKLET 10c About Army Airplanes, their marking and colors. All technical data. Just what you've been looking for..... 10c

Postage 3c each

"Lindy" Charts the Atlantic Skies

(Continued from page 8)

was her skill that saved the expedition from disaster.

For a machine, they chose the Lockheed Sirius that Lindy owns; a big, fast, roomy ship, of great endurance. As most of the flying was to be over water, the Sirius was fitted with pontoons and as a good deal of it was to be over ice and snow, the pontoons were made longer and narrower than usual—equal to the whole length of the fuselage—to enable them to be used as skis for an ice landing if necessary. The pontoons were built hollow and the fuel tanks installed in them; reserve tanks were fitted in the wings and the whole fuselage used for equipment. A new motor was put in, a 700 h.p. Cyclone, one hundred horsepower stronger than the stock motor the Sirius rates. It was fitted with a supercharger that stepped it up fifty horsepower more and a Hamilton variable pitch propeller. The tests Lindy gave the machine showed she had a top speed of 180 miles an hour with full load, but he throttled her down to 125 for most of the flight.

As to the equipment, it included everything. All the latest technical gadgets, such as an earth inductor compass, the drift indicator Gatty invented for his round-the-world flight, the special radio set all Pan-American planes carry and an extra, emergency radio set. There was also a pup tent, emergency rations sufficient to last the two passengers for over a month, rifles, fishing tackle, a machete, a folding rubber boat with an outboard motor, a special gasoline funnel for refueling in snow or rain, invented by the Northwest Mounted Police of Canada with double felt liners that kept the slightest drop of water from getting into the gas. Finally, there was a water rudder that folded up in back of the pontoons. In case of a landing in open water with a broken-down motor, this rudder would be let down, the portable outboard motor installed and the Sirius would become a motorboat, capable of taxiing along the surface as long as her fuel held out. Every possible accident was provided for.

That is, everything but human failure; and human failure nearly put a crimp in the trip at the start. As the Lindys took off from the North Beach airport, the flyer was watching a newsreel plane that came uncomfortably close on his left. While he did so, another one dived right at him from the other side. He put the ship into a vertical bank and then a steep climb and the wing tips missed by inches; then landed and gave that pilot a bawling-out that he will remember for the rest of his life before taking off again.

The first stage was to Rockland, Maine, an overnight stop; then similar quick hops to Halifax, and St. Johns, Newfoundland, and then to Cartwright, Labrador. Thus far the route had often been flown over and there was practically no surveying to do, but at St. Johns there was trouble that called forth all Lindy's skill as a pilot. A forty-mile gale was rolling big breakers in on the beach when he got ready to take off and the boat that took husband and wife out to their plane filled and nearly swamped. The plane was rocking badly and Lindy could not get his mooring rope up. He started his motor and let it warm up, pulling at the rope for full twenty minutes; then slipped his cable, taxied to shallow water and away in an almost vertical climb.

At Cartwright he found the supply ship *Jellinge*, a little Danish steamer the Pan-American had provided as a floating base, with supplies of gas, food and instruments and a reserve plane, a big Fairchild that would be used to fly to the rescue in case Lindy had to make a forced landing. He also found the supply ships of General Italo Balbo's expedition which had just crossed the Atlantic going in the other direction, but he missed the Italian admiral by a day.

Fog held him in Cartwright for three days, while the *Jellinge* steamed on to take up a post off the coast of Greenland. When Lindy did take off the fog was so bad he had to land at Hopedale, 150 miles north of Cartwright and then again a little further on. In spite of the continual fog he got off the next morning and made the long hop across to Godthaab in Greenland, with Anne Morrow Lindbergh directing the flight down the steady beam of radio signals the *Jellinge* was sending out to guide them. "I never shall forget," she said afterward, "the majestic beauty of the Greenland mountains as we first saw them towering above the clouds. It was a new and fantastic world."

They stopped for two days at Godthaab while Lindbergh looked over possible landing fields and picked a site for a ground station, then went on to Holstenborg, the main base for the Greenland survey. Out of this point several long flights were made over the huge ice-cap that covers the whole center of Greenland. There were constant fogs but Lindy found they clung to the coasts. However, the inland districts were fog-free and had good flying weather. The difficulty was to find good landing places, a task which could only be performed when there was bright sunlight, as the whole land was coated with ice and the ridges and hollows showed up only when there was sun to throw a shadow. The famous storms of Greenland he found were not serious for flyers; they came two or three times a day and were very fierce, but they were small and a good plane could always get around or over them.

The most difficult flight came on the third of August when they crossed the Davis Strait to survey Baffin Land for a possible landing field. They were caught in a fog and dense storm with a terrific gale howling about them. It was taller than usual; the Sirius would not climb out of it and they were so close to the magnetic pole that the compass began doing odd tricks. Lindy determined to land in Cumberland Bay and wait till the storm passed, but when he dived through the clouds, he found the bay full of tossing pack-ice. If the motor died on them there it would mean instant death—and at that moment the radio went out on them. Back

on the *Jellinge* at Holstenborg, where they were trying to keep contact, there were some anxious hours before the big red-and-black plane came riding out of the storm.

But that night, more emergency equipment was taken aboard, in the form of heavy sealskin boots and complete suits of sealskin clothes for both explorers. Bright and early in the morning the Sirius was off again on the long hop clear across the Greenland ice-cap to Scoresby Sound, 1200 miles of the most dangerous flying in the world. On this hop Lindy made some observations that are even yet setting the world's scientists by the ears; notably the "splitting of the winds" that sweep down from the north pole and divide half-way over Greenland to blow east on one side, west on the other. As they approached Scoresby, the fliers found a storm raging there, with darkness falling fast and the air full of drifting snowstorms. Lindy put the Sirius into a climb and went up to 11,000 feet, where he found clear weather though there were still clouds 5000 feet above him. He then flew along this narrow tunnel of clear air to Ella Island, the Danish weather station, where he landed, borrowed all the fuel the station had and spent three days in conference with Dr. Lange Koch, the Danish professor who knows more than any living man about Greenland.

The next hop was down the coast to Angmagsik, then across the island again and down to Julianehaab at the southern tip, where the *Jellinge* was now waiting, and the flyers got some more fuel and civilized food; then, after a day's wait, back to Angmagsik. The *Jellinge* came up and there was a period of consultation—did the results so far indicate that the Greenland route was worth surveying any further? Yes, declared Lindy; there would have to be three ground stations on the east coast of the ice-bound island and three more on the west, with perhaps a weather post up north, right under the Pole. But given these things, a commercial flying route across Greenland was perfectly practical. So the plane was loaded up and the next day, without ceremony, the explorers hopped 700 miles of ocean to Rekjavik, Iceland.

There they found Gregson, the English flyer who had cracked up while surveying the European end of the northern route for Imperial Airways and spent a week exchanging data with him, gathering all possible weather and geographical data about Iceland. The data was beautifully complete, except as to landing fields. Nobody knew anything about them so the Colonel took off with the plane and made a personal survey of the whole island from the air, zigzagging back and forth across it and finally coming down on the east coast.

There was no more actual survey work to be done after this and the Lindys headed for Copenhagen in long jumps, to Tverra in the Faeroe Islands, Lerwick in the Shetlands and then the Danish capital itself. It was important because Greenland, Iceland and the Faeroes all belong to Den-

(Continued on page 38)

Model News From Other Countries

(Continued from page 20)

group. This picture was taken during a recent contest held at the "Punchbowl." Fred Steven is the secretary of this club.

Picture No. 2 shows a model built by J. Argust, secretary of the Lithgow branch of the Model Flying Club. This ship is typical of the type which has heretofore been designed and built by Australian boys. It is a very graceful and beautiful looking ship. However, Mr. Freshman is very positive in telling us that it has not been built to the N. A. A. rules. We are certainly pleased that the Model Flying Clubs are taking this matter so seriously and are going to follow the leadership of the N. A. A. in this field.

Pictures No. 3 and No. 4 should be of unusual interest to model builders. The models which you see in these pictures have not been built according to orthodox construction lines. They are the handiwork of Mr. W. Rigby of 45 Valley Field Road, Streatham S. W. 16, England. Mr. Rigby has been in the field of aviation for a great many years and is doing good work at the present time by helping to make the young men of England airminded through writing articles, building and selling model planes. The two ships shown in picture No. 3 are models of the "Supermarine," equipped with wheels instead of floats.

If you will look closely you will see that on the wing of the largest ship reposes a small model of the same design. The miniature model on the wing has a wing span of 3". The wing span of the larger one is 28". The unusual part of these little planes is that they are both made of paper. Believe it or not, the small model flies 75'. The large one makes flights of 200 yds. These flights are very realistic indeed, as may be ascertained by looking at picture No. 4. Here the little ship is shown in full flight in Green Park, London. The fact that these two models are over six months old speaks very well of their durability. It compares favorably with models of other types of construction.

How the Airplane Was Created

(Continued from page 27)

of control. He died August 10th, 1896.

It is worthy to note the contemporary work of Percy Pilcher in England at the same time and along similar lines. In 1893 Pilcher made a spectacular flight of 120 feet in two seconds and later went to Germany to study Lilienthal's system which he duplicated, building five gliders after Lilienthal in 1895. He died in 1899 after a fall in his glider "Hawk" while demonstrating in very unfavorable weather.

Perhaps next to Lilienthal, we must place in importance, Octave Chanute as an exponent of the latter's school of thought and contributor to the successful flying machine. Chanute was a highly successful civil and construction engineer on American railroads. He became interested in aeronautics and wrote his first journal in 1891 and in 1894 published a work called "Progress in Flying Machines."

Although he gave much thought to the possibilities of flying, he was sixty years old before he became actively engaged in it and soon was involved in solving the problem of stability. His designs were similar in effect to his predecessors' but he went further by building multiplanes with five wings. He started gliding in the summer of 1896 and made well over one thousand flights without accident, trying out five full sized gliders until 1897.

Chanute recorded very carefully all the investigations he had made and like Lilienthal, hoped that it would contribute to the solving of the common problems perplexing all the inventors in this field. While Chanute saw in gliding a worthy sport he realized that it also held the key to successful aerial navigation. He lived to see the flying machine a reality and his work was justified in its use by others. He died in 1910.

Having reached the close of the nineteenth century, we find that man has at least achieved free sustained flight, aided as it were, by his own muscular effort alone, but still dependent upon the elements and at the mercy of the wind. This problem, fairly on the path to solution, awaited but a reliable source of energy to reverse the action of the glider flight and give man flight independent of the wind's caprices. How this was done, and the news that electrified the world, is another story and in the next chapter will be unfolded this intensely interesting and amazing event.

"Lindy" Charts the Atlantic Skies

(Continued from page 37)

mark and any company that sets up a flying service across them must have to do with the Danish government. Lindy spent a week in Copenhagen talking with Danish officials and scientific men. What he said to them nobody knows, but apparently everybody was satisfied. Then came a quick hop to Stockholm, where he spent two weeks more, apparently vacationing. Actually those two weeks were the busiest of the whole trip for the explorer of the airways was busily conferring with the pilots and weather-men of the Swedish air service, who have made a special study of Arctic flying under all conditions, comparing his data with theirs and submitting his conclusions for their approval.

In between, he found time to settle a controversy that was convulsing the Swedish aviation service. It was about a new pursuit ship in which three men had crashed. The Swedes were waiting for pursuit experts from England and Germany to decide whether this type of ship was unsafe. Lindy settled the question in half an hour by taking one of the "unsafe" ships up, putting her through all the stunts he could think of and then landing to say that if anybody cracked up a ship like that, it was very likely the aviator's fault.

After this came the only real vacation on the trip; visits to Leningrad and Moscow in Russia, Tallinn in Esthonia, and Oslo in Norway. Then came a hop to Southampton, England, where he landed

on October 4th, motoring up to London. Again he was apparently spending his time in visiting and banquets; actually, he was giving twelve hours a day to conferences with Imperial Airways officials, exchanging data and plans with them and when he finally took off for Galway in western Ireland, it was to check their conclusions on the question of the Newfoundland-Ireland trans-Atlantic route.

This was followed by a brief hop to Inverness in Scotland, which would be the natural terminal of the Greenland route and then he was off to Paris for more conferences, this time with the Air-France people, while Mrs. Lindbergh enjoyed the shops of Paris. Then came Amsterdam and an exchange of data with the K.L.M. and finally a flight to Geneva in Switzerland. This last trip illustrates the thoroughness with which Lindy does things. Geneva is the headquarters of Swissair, a transport company which has been flying an outfit of fast Lockheeds over mountains and glaciers for several years. Greenland is a country of mountain and glacier; and Lindy was out to discover whether their data on mountain flying agreed with his own—that forced landings must be put out of the question on such runs and that the way to do it was to increase and train the crews of planes rather than stepping up their motor power. They did agree.

After that there was nothing left to do but hop for home. It was already November by this time and any attempt to fly the northern route in the face of the westerly gales and without ground service would be futile, but Lindy hardly cared about the idea of coming back on a ship. There was a cable discussion with Pan-American officials on this side and the end of it was that he was to make a survey of landing fields and conditions over the southern route also. So, when his big red and black Sirius soared over Lake Geneva, its nose was pointed for the tip of Spain.

The program was one day's flying, one day's halt for rest and survey and the next day in the air again. Following this plan of operations, the big Sirius soared from Santona, Spain, for Vigo, from Vigo to Lisbon, from Lisbon 1000 miles over the open sea to Horta in the Azores, where the NC-4 dropped down out of the sky one day as the first airplane to cross the Atlantic, from Horta to Ponta Delgada, also in the Azores, from there to Las Palmas in the Canary Islands, then with a brief stop on the African coast and a visit to the Cape Verdes, to Bathurst, the base for flights across the South Atlantic.

There Lindy found a German station with experienced flyers of the Lufthansa and the ground station for the regular Zeppelin run from Africa to Brazil and there was another week of exchanging data and tuning the Sirius up for the longest hop of all, 1834 miles of open ocean to Natal in Brazil. The big jump was made on December 6th. There was a brief wait at Natal while the explorers consulted the Germans again (the Lufthansa has a station there also) and then, with the work of the survey done, the Sirius pointed its nose toward home. The rest of the story is simple and was just a question of driving the plane fast enough to get the flying family home for Christmas and no more worries. And on December 19 the Lindbergh plane dropped into the water at the very dock from which she had set out on her 29,000 mile flight—more than the distance around the world.

And what does it all mean? Is there going to be a trans-Atlantic service? Sometime certainly, pretty soon, perhaps. Just what Lindbergh's report contained nobody knows but himself and the president of Pan-American Airways; there was only one copy of it, and it was written in long-hand. But there is still some work to be done—"We will have to have a survey of winter flying conditions in Greenland first," Lindy has said, for one thing, and for another, Pan-American is casting an eye at the Armstrong seadrome idea. If that plan works the northern route will be unnecessary. But in any case, they have built the six biggest planes in the world, capable of flying the Atlantic at one jump and they have bought an airport on Long Island——just in case . . .

The Aerodynamic Design of the Model Plane

(Continued from page 21)

ditions arising during the flight of an airplane. If possible, visualize the action clearly in your mind in order that you may comprehend the problem of arranging them properly and solve it readily.

First of all we will consider the *weight* of the airplane. This obviously is equal to the sum of the weights of all the separate parts of it. The pull of gravity is equal to its weight and acts at a point called the center of gravity, marked (C.G.) in Fig. No. 86. This force always acts vertically regardless of the position or speed of the airplane, Fig. No. 87. The actual pull of gravity remains the same under all conditions. However, any *change in the velocity* of the airplane in *any* direction, forward, upward or sideward, causes the inertia of the mass of the airplane to create a force which acts at the center of gravity in a direction opposite to the change in motion. For instance, if the airplane was suddenly pushed upward by a rising gust of air, the inertia of the plane would cause a force to act downward at the center of gravity. Thus the force acting at the center of gravity would be the sum of the weight of the airplane plus the force due to the upward displacement. If the forward speed of the airplane increases, the plane's inertia causes a force to act at (C.G.) in a backward direction as indicated by arrow (H) Fig. No. 86.

Our second force, *lift*, is the next one to consider, (L, Fig. No. 86). Here the situation is a little more complicated. The lift is generated by the wing or wings and acts upward vertically from the median line of the airfoil section. Regardless of the position of the airplane the lift component of the air's reaction on the wings is always vertical, see L, Fig. No. 87. The point on this median line at which the lift acts is called the center of pressure and is not fixed but changes with any variation in the angle of attack of the wing. At small angles of attack the lift acts at a point on the wing about 50% to 55% of the chord back from the leading edge, L, Fig. No. 86. As the angle of attack increases, the center of lift moves forward toward the leading edge of the wing until at ten degrees angle of attack the center of lift (pressure) is about 30% of the chord from the leading edge. Thus the lift force is constantly changing with different angles of attack, between limits at 55% of the chord to 30% of the chord from the leading edge. This condition would be exceedingly helpful if the center of lift acted at the forward point at small angles and moved backward with any increase in the angle, for it would then tend to correct a displacement from the normal flying angle. However, as it is, this movement of the center of lift causes an extremely unstable condition which must be corrected by a careful arrangement of the other forces involved in the problem.

It is advisable to reduce this movement of the center of lift as much as possible and wings of various forms and cross section have been developed which induce very little center of lift movement. Examples of two such sections are shown in Fig. No. 57 and No. 58. The center of pressure movement on the section shown in Fig. No. 57 is reduced by the curved up trailing edge, K, and on the section in Fig. No. 58 by negative bellied-down camber of the lower surface of the airfoil section. In both cases the positive pressure of the air on these turned up rear edges, K and K', is very small when the wing is passing through the air at small angles of attack. Thus, the resultant pressure or lift on the wing acts at a point nearer the leading edge. As the angle of attack of the wing increases, the leading edge rising, the rear part, K, of the under surface becomes more positive and generates a greater proportion of the lift. Thus at high angles of attack the center of lift is farther to the rear than is normally the case. The distance between the limits of motion are therefore reduced and in some cases where the reverse curve is pronounced, the center of pressure does not move at all thoughout the range of angles of attack.

The movement of the center of lift may be reduced, or even reversed by a third method already described previously in this chapter and illustrated in Fig. No. 59. This is accomplished by sweeping back the wings into a (V) shape and giving the wing tips less angle of incidence than the center portion of the wing. In the figure you will note that the wing cross section taken at the center has a greater angle of incidence than the section at the wing tip.

In this arrangement, the wing tips lift very little when the plane is in level flight. Most of the lift is generated by the center portion of the wings. However, if the angle of attack of the wing increases, the lift of the wing tips increase more than the center portion, because the *percentage increase of the normal flying angle* is greater at the tips. Thus, the wing tips being farther to the rear than the center portion due to sweepback, the resultant lift on the wing moves towards the wing tips and *backward*. The rear of the wing, (and tips) are pushed up, back into normal flight attitude.

The whole idea relative to the center of lift in securing longitudinal stability is to reduce its movement as much as possible. It has been shown already how this movement can be overcome effectively by the horizontal tail surfaces. This arrangement has the same effect as a negative stabilizer. In fact the wing tips are actually negative stabilizers. How the tail surface operates to accomplish this will be shown later.

The intensity of the lift force does not vary extremely. However, it does change a certain amount with a change in the angle of attack. As the angle of attack is increased through the action of the pilot depressing the tail in the case of a large ship, or by the tail being depressed by a definite adjustment in the case of a model, the plane rises or climbs due to an increase in the lift.

Suppose we consider our next force, the *thrust*. The point at which it acts never changes, nor does the direction in which it acts, relative to the airplane. However, its intensity changes throughout the flight in the case of a model plane. At the start

of a flight, the rubber is wound tightly and the propeller spins fast, producing maximum thrust. As the flight progresses, the rubber unwinds and the thrust becomes less and less until the motor is fully unwound. Then the thrust ceases to act. This variation of the thrust is extremely important. When used in proper relation to the other existing forces, it serves as a means of aiding the stability of your model and establishing a desired performance.

The *resistance*, R, (drag) of an airplane is induced by the air striking the various parts that make up its structure, as it passes through the air. It is equal in intensity to the sum of all the little resistances caused by the many individual air particles striking the airplane. It is the resultant of these resistances and acts at a point called the center of resistance with the same effect as the action of all these small resistances. The *direction* in which it acts is always opposite to the direction of travel of the airplane. If the airplane is in normal level flight as in Fig. No. 86, it acts parallel to the line of thrust and opposite to it but if the plane is flying slowly in the direction D as in Fig. No. 87, with the longitudinal axis slanting upward, the resistance acts as indicated by Arrow R′. Usually the center of resistance in the latter case is lower than in the case of normal horizontal flight. This is due to the fact that the tail of the plane drops and the lowered resistance of this part of the airplane causes the resultant resistance to be lowered.

The only forces remaining to consider now are those acting on the stabilizer. The forces discussed up to this point act in a definite manner irrespective of any desires we may have concerning the matter. However, the forces acting on the stabilizer may be changed in intensity and direction of action as may best suit the situation, in our judgment. This change is accomplished by setting the stabilizer in such a position and at such an angle that will give the required effect.

The stabilizer may be set at a positive angle, a negative angle or parallel to the line of thrust. When the airplane is in normal, level flight and the angle is positive, that is, the front edge raised higher than the rear, (Fig. No. 86), the relative wind will strike the under side of the stabilizer and thereby cause a lifting force (S′) to act on it. If the stabilizer is set at a negative angle, the relative wind will strike its upper side and cause a down pressure (S) on it. In the neutral position, no force will be generated either upward or downward.

The values of these forces acting in either of the two directions are dependent upon the amount of negative or positive angle of incidence given the stabilizer. The amount of force generated in each case is approximately proportional to this positive or negative angle.

Now let us see what happens when the angle of flight increases or decreases. Suppose the forces acting on the plane are in balance when the stabilizer is set at a negative angle of (—2°). In this case there is a downward force on the stabilizer when the plane is in level flight. Then, reacting to some disturbing air condition,

(Continued on page 48)

The Development of the Fokker Fighters

(Continued from page 10)

to a better streamline shape. This cowling was made in three main pieces: a circular nose cap, and an upper and lower section joined by buckles along the center line. Directly behind the motor the pilot had his "office." Part of the fuselage covering was omitted here to improve his view downward. Just to the side of the pilot's cockpit, radiators were clamped to the fuselage uprights there. Rather than make them wide facing the wind, the type of radiator used had on its side a series of louvres which caught the wind as it went by. The high square type more familiar to this country is the honeycomb type, similar to automobile radiators.

The fuselage framework was built up of steel tube longerons and uprights in the conventional manner. Except for the aluminum covering of the front of the fuselage, the entire frame was cloth-covered. A short two-wheeled landing gear with spreader bar sprung on rubber cord and a spring tail skid comprised the undercarriages.

In the M-18E several improvements over the M-17E were apparent. A considerable section of the wing covering of the lower plane was omitted in the vicinity of the cockpit to provide the pilot with a better view below. Instead of a door to gain access to the cockpit, which was prevented by the radiators, a series of tubular footholds were welded to the first fuselage upright. One was just below and in front of the left radiator, the other just above the radiator on that side. To prevent the pilot from injuring his head in the event of an upset, two heavy streamlined tubes projecting above the top wing came in contact with the ground first. These two tubes supplanted the considerable structure on the M-17E.

Armament of the new type consisted of one Spandau air-cooled machine-gun synchronized with the propeller. Jams and minor troubles of the gun could be fixed on the wing as the breech was within easy reach of the pilot at all times.

A wing anenometer speed gauge registered the air speed on the instrument board. This device was located on the right forward wing strut. Again we have no records as to performance, or weight data available, but as an estimate, the writer would say at the best 90 MPH for top speed with very sluggish control except at high speeds.

Seemingly stumped again and at the place where most men would give up, Fokker took his last possible chance at designing a new type. He had for a background the experience of six types, all combinations of one another. This last combination to be discussed this month was the most successful, first because of its efficient design and correct combination; second, if we are to be superstitious, the odds were with Anthony H. G. Fokker this time.

The new ship was called the D.1 at the Front, but at the Schwerin, the plane was known as the M-18 Flachenvern. Though we cannot say whether or not Fokker let Albatros influence slip into his D.1 design, by looking at the side elevation here you will notice a decided similarity in the fore parts of the two types. At the same time you will notice that the plan view of the D.1 greatly resembles the Bristol F-2B Fighter not yet constructed. Whatever the case, the D.1 was a good ship, in fact an excellent one considering its power plant. A good many ships of this type were pressed into service on the Eastern and Western Fronts during the remaining months of 1916, and were then relegated to training stations back in Germany.

This ship was really a triumph in design for Fokker because of the conditions surrounding its construction. Primarily, it was a plane of inferior power, in which the full excellence of its design could not be shown. Secondly, the strong prejudice of late 1915 and early 1916 was still against Fokker and his ship was not given full use of its advantages.

Strongly resembling the M-16 types, the Fokker D.1 was in every way a conventional two bay biplane. Wings had no dihedral or sweepback. A slight angle of incidence was built into the cellule, but this was greatly reduced in flight as will be explained later. The two planes of equal span were built up of 14 full ribs in each panel, the center section not included. Between each pair of ribs one false rib prevented excess sagging in the leading edge of the airfoil. Compression members to which strut fittings and internal wire bracing were secured ran parallel to the fifth and tenth ribs from the center. Interplane wiring was not unusual except that it combined wiring practice used in both one and two bay biplanes. As is shown in the drawings, wiring not only joined the interplane struts but flying and landing cables ran from the center section terminals to the outer strut fittings as well.

Center section struts were simply steel tubes welded to the fuselage longitudinals, while interplane struts, four in number, were the usual steel, wood faired ties.

The most unusual feature of the D.1 wings was the almost primitive method of attempting to use wing flaps. The trailing edges of the planes were flexible through the use of a slotted rib. As can be seen in the photograph and the drawings, the trailing edge of both wings had a decided upturn near the tips. The theory was that as the speed increased, this flexible edge would flatten out and decrease resistance, and at the same time increase speed. Then on landing, or slow flying, the lessened speed would allow the edges to assume their original curved shape, creating greater lift at low speeds than would be possible with the section at high speed shape. This was by no means a new system, since it was incorporated in most all types since the early days of Antoinette, D.F.W., and Albatros.

The use of a vertical type engine simplified to a great extent the streamlining of the fore part of the D.1 fuselage. As in previous types, the entire cowling was stamped aluminum or an alloy. To facilitate motor repairs the cowl was easily detachable in several places. On either side of the fuselage two large radiators of the honeycomb type were located in the slip-

stream. Aluminum covered the fuselage up to the cockpit from which it was fabric-covered as usual. Welded steel tubes made up the framework with steel wire looped around quadrants for further bracing purposes. The cockpit was let in just under the trailing edge of the wing which was removed at that point to aid the pilot's visibility. A turtle deck was continued after the cockpit to aid in streamlining.

In the D.1, the landing gear was of the "V" type with a fairly wide tread. Two streamlined wheels were sprung on rubber cords. Although not generally noticeable, at least at first, rubber was of very poor grade at this time and continued to be so until the end of the war. With enemies on all sides Germany had no means to secure fresh rubber and so had to use what she had on hand. This fact will play an important part later on.

A distinctly Fokker type of tail assembly with comma rudder was used on the D.1 and need not be described here. The usual tripod tail skid was fitted.

Although the Fokker D.1 was equipped with a motor far inferior to the power plant of the then popular Albatros D.1, its performance was very near the same. As mentioned before this was due to Anthony Fokker's engineering ability. The manner in which he rises here in face of suppressing competition and with obsolete equipment is as good a lesson in perseverance and character as can be found. The Fokker D.1 was good enough to break the ice that had held Fokker "snowbound" for half a year.

Below is some data on the D.1 Fokker supplied by a German periodical published during the war:

Weight loaded	1457 lbs.
Weight empty	1020 lbs.
Length overall	18' 10"
Wing span	29' 10"
Height	7' 5"
High speed	93.0 MPH
Climb	800 ft. per min.

Part 8 of this series will bring you the forgotten Fokker types D.II, D.III, and D.IV, ancestors of the D.VII Fokker of 1918.

Aviation Advisory Board

(Continued from page 34)

one-half times the diameter of the propeller. If the pitch is smaller, of course the propeller blade area may be less.

Question: Should the blades of a four-bladed propeller be arranged in a plane or two planes. Is there any other arrangement?

Answer: All four blades of a propeller should be in the same plane for greatest efficiency and placed at 90° or perpendicular to each other. Placing one set of blades of a four-bladed propeller back of the other is the same as having the top wing of a triplane staggered forward relative to the center wing and the center wing staggered backward relative to the lower wing. Three or four blade propellers are used on large ships for one purpose only and that is to obtain the given amount of blade area and yet keep the diameter of the propeller down to a minimum.

Airways—Here and There

(Continued from page 20)

Travel Air built by Manion's brother. This picture was made with a time exposure of 30 minutes using a kodak. The model is resting on the Manions' workbench. Evidently Manion is a business man for he gives you readers a tip. He says, "Make a scale or a flying scale model of a locally owned plane and then you have a good chance to sell it to the owner." This is what happened in the case of the Travel Air. It is a duplicate worked out in careful detail of a ship which was housed at a nearby airport.

At the Newark Airport, our friend, the famous Casey Jones, recently opened a school for young men in which they might study the fundamentals of aviation. He believes that this is the proper way to prepare for a future flying career. A thorough understanding of the principles of design and construction of airplanes makes for better fliers and fewer accidents. Picture No. 9 shows Casey's school in full swing with Lee Warrender showing one of the pupils how his new miniature training plane invention operates. This device is used to teach pupils how an airplane is controlled. It helps them to get the flying feeling before they get off the ground. This school is the first of its kind in the country.

It seems that the model airplane bug has invaded the moving picture industry; for Jackie Cooper was recently caught in an unguarded moment, pursuing his pastime, aviation, in picture No. 10. Jackie built the fleet of airplanes which you see in the picture. Will he not send us a word or two about his models and a few pictures of them. Our readers, we are sure, will be extremely interested in knowing about his work. We are assuming of course, that Jackie reads Universal Model Airplane News and will take note of this request. As many of you know, he is a popular star of the Metro-Goldwyn-Mayer Company.

Here we have a very unusual model of a Boeing Pursuit ship in picture No. 11. It has a 6" wing span and is completely equipped with cowling, pants and wires; built by A. F. Kitchel, Jr., of 1090 Yale Station, New Haven, Conn. Your model builders will realize what a difficult job it is to make such a well detailed ship to such a very small scale. However Kitchel is no slouch at building models. He is now occupied in building a complete collection of war planes. When Kitchel is finished, (if he is not too old), he can hold an exhibition of his own and we do not doubt that it will be worth seeing.

Picture No. 12 shows a Hall Racer, built by Jesse Davidson of 1075 Longfellow Ave., New York City. Apparently this model is in full flight. However, Davidson tells us that the photograph is faked. He says, "The photo was taken with the model suspended by a white thread from a radio aerial on the roof." Davidson won third place in the Gimbel-Roxy Contest held some time ago. He says, "The hop with Clarence Chamberlain, which was my reward, was one of the biggest thrills of my life." We can easily understand this as Chamberlain allowed Davidson to handle the controls while over Newark, N. J. I doubt if there is a bigger thrill in anyone's life than that which exists when one grasps the control stick for the first time and feels the airplane respond to the slightest motion of their hand. In all activities of life, however, one gets the greatest thrill out of the feeling of mastery and of having something respond to one's will.

Recently we received another letter from Davidson telling of an incident which we think is well worth relating. Regular readers of the magazine will perhaps remember the story which was told in "Model News from Other Countries" about the hawk which attacked the airplane. Well, Davidson comes back with a better one and moreover, he asserts that this is absolutely true. (All those who doubt it get in touch with Mr. Davidson immediately).

He says, "I built a 2' flying model of a D.H. Gypsy Moth some time ago. Having the nature of my experiment in mind, I enlarged the landing gear, deepened the fuselage and fitted a 12" prop. I proceeded to hunt for the victim of my tomfoolery and found him one fine day on a golf course. It was a bullfrog and it was a heavy one! My friend who was armed with a camera sympathized with the frog and soon was tying a parachute made from his best handkerchief.

"Mr. Frog was assisted into his specially constructed 'office' and I launched the model from a 40' incline. The D.H. actually climbed like an elevator and it hung on its prop at an altitude of approximately 100'. Suddenly a gust of wind threw the right wing up putting the ship in a vertical bank. (Or was it the propeller torque? Editor). This frightened "bullfrog" into wriggling loose (of course, nothing up to this time had happened to disturb his equilibrium). He plunged down and the chute opened perfectly, landing the frog on all fours.

"The model lessened of its weight, continued in its flight in another direction and we chased it. We finally retrieved it in good condition (save for a wet pilot's seat). However, a return to our starting point and a hunt for Mr. Frog revealed nothing. He had disappeared completely and to this day we have never seen anything of him."

Picture No. 13 shows Davidson in the act of launching the model with the frog in the cockpit. So far Davidson holds the record for telling tall stories. Not that we doubt him, but this merely puts it up to some other readers to tell a better one. If we get many of these we will be forced to include a "Tall Stories" column in our magazine. What do you think about it?

CLUB NEWS

Kansas Miniature Airplane Championship

Coming through on the last day of competition to capture three first places and one second, Bob Loper, of Topeka, Kan., flew away with the Kansas State Miniature Airplane Championship for 1933 in the contest held a few weeks ago at Topeka. It was the fourth consecutive time that Loper had won or tied for the senior

championship and the second time that he had captured the all-around title.

The junior title was won by Marion Thomas, also of Topeka and his prize was a revised edition of Compton's pictured encyclopedia, valued at $75. The set was donated by the F. E. Compton Co.

Loper's outstanding flight was made in the outdoor duration event, in which a twin-pusher machine of his own design remained aloft for 14 minutes, 8.4 seconds, to set a new contest record.

About 30 entrants took part in the contest, held each year in connection with the Kansas Free Fair at Topeka. There were four events: indoor duration, indoor fuselage model duration, outdoor duration and outdoor gliding for duration.

Picture No. 14 shows a group of the contestants who took part. Robert Loper is shown with his 14.8 minute winner at the lower left part of the picture.

Loper won as a symbol of the championship, a silver airplane trophy donated by the Topeka Kiwanis club and several cash prizes in individual events. He also qualified for the $10 first prize for the senior title but was forced to waive this prize as he had won the grand prize last year. It was awarded to Joseph Zishka, Nortonville, Kans., who had the second largest number of points.

How You Can Build the Waco Cabin Plane

(Continued from page 13)

while the rear end is bent over and glued together so that it forms part of the rudder post. This is covered with paper also.

Wings

First the ribs are cut out (22 of them are actually used, but it is advisable to cut one or two extra as spares), notched, then the spars, leading edge, and trailing edge are made. Cement the different parts together as shown on plan, then bend the wing tips, using same procedure as for making stabilizer outline, and cement them to the rest of the wing frames. (You will notice that false ribs are used in certain parts of the wing frame. The purpose of the false ribs is to securely anchor the interplane struts when the ship is assembled.)

After the tips have been cemented into place, take a soft piece of 1/8"x5/16"x3" balsa and cement it to that end of the wing which is to be attached to the fuselage, trimming it down to the rib shape. Set the wing frames aside to dry.

Covering

The color scheme suggested is blue and orange. First cover the windows of the fuselage with a light grade of cellophane, then cover the rest of the fuselage with blue jap tissue. The fin and tail fairing "Q" are also covered with blue tissue. The stabilizer, rudder and wing frames are covered with orange tissue. When the various parts are covered, spray them lightly with water and allow them to dry. Then give them a coat of dope.

Assembly

Cement the stabilizer to the fuselage, taking care to have it lined up correctly, then cement the tail fairing "Q" to the stabilizer (fig. 2). Cement the rudder to the rudder post of the fuselage and to the tail fairing. Cement the top wing to the fuselage, giving it an angle of incidence of 3½ degrees in relation to the line of thrust. (The line of thrust passes through the center of the rubber motor, when it is tightly wound). Give the upper wing 5/8" dihedral for each tip.

Cement the lower wing to the fuselage, giving it 2 degrees incidence in relation to the thrust line, and give it enough dihedral to make it parallel to the upper wing when viewed from the front. Cement struts A, B, C, and D into their proper positions, after having covered them with blue tissue.

Motor Detail

The cylinders are made by rounding a piece of ¼" sq. balsa, then winding black thread around it. Cut the cylinders to size and cement them into place. The ring is made by sanding a piece of 1/16" thick x ¼" wide balsa, of proper length, to the cross section shown in fig. 1. Cover that side of the strip which is to be the inner side of the ring with orange tissue, then, before the dope is quite dry, cement the strip around the cylinders so as to form the ring. When this has been done, paper the outside of the ring with orange tissue and you have an anti-drag ring which is light yet strong.

Prop Detail

Mark out the prop block as shown, then cut the blank out. When the prop is finished, give it a coat of dope, then sand lightly when dry.

Pass a piece of 1/16" O. D. brass tubing through the prop hub, then cement the prop fitting (fig. 4) to the rear of the prop. Make the ratchet (fig. 4) and cement it to the front of the prop. Make the prop shaft, pass it through the rear of the nose block, slip a few washers on it, put the prop on, bend ⅛" of the front of the shaft at right angles to the rest of the shaft and the model is completed. It may be powered with either two strands of 3/16" flat rubber or four strands of ⅛" flat rubber, depending on the weight of the completed model. The original weighs exactly 1 oz., is powered with two strands of 3/16" flat rubber and is a graceful and consistent flyer.

Flying the Model

First determine the center of gravity of the model by holding the upper wing about 1¼" back of the leading edge, with the tips of your index fingers. The model, if built correctly, will balance on an even keel. If it is tail heavy, add a little weight to the nose. If it is nose heavy, add weight to the tail, until it balances. If the wings and tail surfaces have been set according to plan, the model will have a smooth glide. Give the motor about 150 turns (by hand) and launch the model into the wind, with the nose slightly raised. If the plane dives, raise the trailing edge of the stabilizer about 1/16". If the plane stalls, raise the leading edge of the stabilizer the proper amount.

When fully machine-wound, this model is capable of making flights averaging 50 seconds in duration.

Who Was Who at the Eastern States Contest

(Continued from page 32)

medal given by Universal Model Airplane News and Mr. Edwin T. Hamilton's latest book, "A Complete Model Aircraft Manual." Third was George Schweigart of National Park, N. J., with a time of 6:52 2/5 minutes. Fourth was Alfred Rubin of 112 Dewey Place, Atlantic City, N. J., with a time of 6:42 1/2 minutes. "Peter" Andrews of 5922 Nassau Road, Phila., Pa., with a time of 6:41 4/5 minutes, was fifth. Jack Haw of 3169 Reach St., Phila., Pa., with his flight of 6:24 3/5 minutes, won a Comet construction kit.

In the Fuselage Duration event Alfred Bogush of 134-10 St., Springfield, Mass., won first place with a flight of 5:55 2/5 minutes. He was awarded a trophy donated by the Lata Balsa Wood Co. of Brooklyn, N. Y. This was an unusually fine trophy of polished silver and gold plated inside. The Balsa Wood Co. has always been very good to the model builders and particularly the winners of contests; having donated prizes for nearly every major contest in the east. The Balsa Wood Co. supplies nearly all of the balsa wood used by the model builders throughout the country. It is this material which makes it possible for model builders to obtain such marvelous time with their ships. Second place was won by John Stokes of Huntington Valley, Pa., with a flight of 5:35 2/5 minutes. He was awarded a gold model and Mr. Edwin T. Hamilton's "Complete Model Aircraft Manual." Third, fourth and fifth places were won in the order mentioned by Paul Karnow of 2014 Tulip St., Phila., with a flight of 4:55; Alton DuFlon of Ridgefield, N. J., with a time of 4:27 2/5 minutes and Allen Penn of 14 E. 174th St., N. Y. City, with a flight of 4:14 2/5 minutes. These three young men were awarded gold medals donated by Universal Model Airplane News. Don Donough of Westley Ave., National Park, N. J., won sixth place with a flight of 4:11 minutes. He was awarded a Comet Kit.

In the Baby R.O.G. Contest first place was won by Herbert Greenberg of 205 Keer Ave., Newark, N. J., with a flight of 6:44 1/5 minutes. Greenberg is a member of the Bamberger Aero Club. He was awarded a trophy offered by the Whitfield Paper Co. of New York City. This concern is well known to model builders who use fine Japanese tissue paper for covering their ships. Second place was won by Stanley Jonick of 811 E. Almond St., Phila., Pa., with a flight of 6:32 3/5 minutes. He was awarded a gold medal and Mr. Edwin T. Hamilton's "Complete Model Aircraft Manual." Third, fourth and fifth places, in the order to be mentioned, were won by "Peter" Andrews of 5922 Nassau Rd., Phila., Pa., with a flight of 5:55; Jesse Jessen of 634 W. Cambria Ave., Phila., Pa., with a flight of 5:41 minutes, and Salem Barrack of 198 Baltic St., Brooklyn, N. Y., with a flight of 5:38 3/5 minutes. These three young men were awarded gold medals.

None of these flights were of exceptional duration due to very poor air conditions.

Though great care was taken to keep the doors and windows closed, the air was continually boiling and in great turbulance. This was due, as far as we could determine, to the extremely low temperature outside of the building. The air inside the armory, coming in contact with the roof, would be chilled; this would cause the air to drop quickly along the sides of the building. It would then speed across the floor and boil up in the building. The ships were bumping around all the afternoon and they had a very difficult time to gain altitude. Many ships were present which were capable of 15 to 20 minutes with the proper air conditions.

John Bartol and Wilbur Tyler of Boston, Mass., had a ship which would make this amount of time ordinarily, but unfortunate conditions caused their ship to be smashed to kindling wood before they had a chance. The most regrettable incident of the contest was the experience of John Young of New York City. Many of the boys failed to take official flights early in the contest, allowing too great a proportion of the flying time for trials and adjustments. John was one of these unfortunate young men. It so happened that on his flight, which started 5 minutes after the contest officially closed, he made a duration of over 10 minutes 35 seconds with his duration model. This was better than the first place of Edward Beshar who did 10:28 3/5 minutes. It is a very excellent example of what not to do.

All of the winning models were beautiful jobs. However, there were many disappointments among expert builders. It seems that the cold weather affected the microfilm and balsa wood, so that the part of the models made of these materials were extremely brittle. This resulted in many cracked up planes after a jarring ride over the snowy and bumpy roads. They arrived sadly dilapidated. Under these conditions it would be advisable to pack the models with the greatest of care and possibly wait until the contestants arrive at the armory before they were covered with microfilm. Some of these unfortunate contestants, not to be denied, secured some equipment from the armory and proceeded to make their microfilm on the contest floor. By doing this they were able to recondition their ships and pull off some exceedingly fine performances.

We wish to extend our appreciation to the officials of the armory for supplying the place to hold the Contest and to all those who aided in the carrying out of the Contest successfully.

Build the Martin Bomber

(Continued from page 23)

ing the model. The plans are drawn 1/8 inch to the foot and the dimensions shown are in proportion to actual size. Study the plans carefully noting the general details and assembly of the model.

Fuselage

Carefully mark exact shape of fuselage on wood block. The sections of the fuselage when located at their respective places will guide you in shaping the fuselage. Finish to correct shape with fine sandpaper. Cut out to depth of approximately 1/4 inch, where cockpits are located.

Wings

Check wings with plan for exact size, then carefully shape to proper cross sections. Neatly file grooves to represent ailerons and stub wings. Make right and left wings. The fillets at the joints may be made by applying plastic wood.

Engine Cowls and Nacelles

In constructing the engine cowls and nacelles, great care and skill is required as these add greatly to the appearance of the model. Circular grooves, indicating cylinders, will give that realistic effect. If possible die-cast three-bladed finished propellers are to be used.

Cut out at the leading part of the wing to shape of streamline end of nacelle, so it will snugly fit into wing. Cement all around and fill in joints with plastic wood.

Stabilizer and Elevator

Mark stabilizer and elevator outline on wood, carefully shape to cross sections and file grooves for elevator as shown. Cut slot to correct length in fuselage to accommodate stabilizer and cement in place when assembling. Fill in with plastic wood and shape.

Fin and Rudder

Mark fin and rudder outline on wood carefully, shape to cross sections, and file grooves for rudder and cement in place. Fill in with plastic wood and shape fillets.

Landing Gear

The landing gear struts are made of hair pins or steel wire, as shown in detail on plans and soldered together where the two struts meet at center of wheel axle. Two sets of strut assemblies are required for each wheel. Shape wheels smoothly and carefully as shown and slip axle into wheel at center. Bead axle ends with cement to give hub cap effect. Other ends of struts are pushed carefully into the wings in place to correct height and cemented.

Tail Wheel

The tail wheel can be made of a bead of proper size with wire run through hole and shaped as shown on plan. Push into fuselage and cement.

Windshields

Cut and shape windshields to partly enclose cockpits. A completely enclosed transparent turret is provided for the protection of the gunner and guns at the forward part of the fuselage. Use thin celluloid for turret and windshields.

Assembling

Before assembling apply one coat of thin shellac or dope to all parts as filler. When thoroughly dry sandpaper to a smooth surface. Now cement rudder, stabilizer and wings to fuselage. Be sure to place wings in perfect alignment so it will have the exact dihedral angle.

Color Scheme

All surfaces, olive drab except rudder which has Army red, white and blue stripes (noted on plans). Star insignia-red, white and blue, (noted on plans).

CLASSIFIED DIRECTORY

Advertise in this directory for quick profitable results. Rate: 10c per word. Cash with order. Minimum space, 16 words. April ads. must be in by February 4th.

MODEL AIRPLANES—PLANS—MATERIALS

LOOK! Clear, Colorless Cement, $1.50 gallon. Send for free sample. Latest prices, guaranteed supplies. Ace, 4504 8th Ave., Bklyn, N. Y.

BOYS! Here's Fun Galore! Make your own wood turning lathe out of scrap material; make wheels, cowlings, etc. Our perfected plans show you how. Only 25c. Aero House, 3163 Clifford, Latonia, Ky.

BALSA Sheets, 1/16x2x36, 2 for 5c. Minimum 10 sheets, 10c postage. Price list for postcard. Alpine Aero Supply, 4912 13th Ave., Bklyn., N. Y.

NEW! Entirely new line of kits and supplies. Same high quality and lower prices. 5c coin brings you new price list. Art's Supply, 215 Mountain Ave., Arlington, Mass.

12" FLYING Robins, 20c; 22" Mono-Pursuit, 75c; 6" Solid Models, 15c. Bainbridge Models, 7 Bainbridge St., Bklyn., N. Y.

FINISHED solid scale British 10½" DH4 complete with movable controls, $2.50. Christie Batlas, Box 160A, Morgantown, W. Va.

WANTED: 1000 boys and young men to build model airplane for us. We supply stock and buy what you build. Earn from $10 to $30 weekly. No experience necessary. Send 25c for instructions and supplies. John Chico, 127 Farmington Ave., New Britain, Conn.

FINISHED 4" Curtiss Hawk P6E only 50c. Send stamp for free catalogue. Genesee Aircraft, 141 Westfield St., Rochester, N. Y.

IMPERIAL Leads again. Price list sent free. Imperial Model Aero Supply, 416 McDonald Ave., Bklyn., N. Y.

PURSUIT Flying Models with Machine Guns. Featuring real Dog Fight. List 5c. Jones, P. O. Box 31, W. N. Brighton, N. Y.

FREE Price List. Your address on post card brings it. Model Aero Shop, Huntington, N. Y.

SAVE Money! Balsa scrap bundle. All wood usable. Liberal assortment of strips, sheets, blocks, $2.00 value for 75c postpaid. Limited supply. Model Co., 1140 53rd St., Bklyn., N. Y.

15" FLYING Model Kits 25c plus 5c postage. Hawk P6E, Boeing P12F, Vought Corsair, Fokker D7 & D8, Spad, Jenny, and 10 other models. Complete line model supplies. 20" Boeing P26 Fighter Kit, 75c prepaid. Modelcraft, 2125 W. 54th St., Los Angeles.

DEALERS! Clubs! Send for amazingly low wholesale list. Model Utility, 1140 53rd St., Bklyn., N. Y.

CURTISS Hawk, Lockheed Vega, Boeing Fighter; 12" solid scale models. All parts complete and painted. Ready to assemble. Price 50c each postpaid. Realistic Model Co., 3705 East Kirby, Detroit, Mich.

FINISHED Scale Models, 6"—80c. Gee Bee, Hawk P6E, Corsair SE5, Helldiver, Laird, XP-936. Sanpeitro's Shop, 1044½ Balbo Ave., Providence, R. I.

NEW Construction Method. Flying 13" Monocoupe 110 or Sport Cabin. Either kit 25c postpaid. Speed Model Aircraft Corp., Clarinda, Iowa.

MONTANA, Wyoming, Idaho, Dakota Boys—Complete Kit Service. Write for plan. Sumperior Models, Billings, Mont.

TRAVIS Multi-Flex Bearing—amazing performance, automatically self adjusting. Price 30c. Travis Model Airplane Co., Colorado Springs, Colo.

DEALERS and Clubs—Write for our Price List of Model Airplane Supplies. We guarantee you won't be sorry. Prices lower than ever! Wholesale only. United Model Supply Co., P. O. Box 351, 16 Court St., Bklyn., N. Y.

FREE Tube Cement with price list. Send 3c stamp. Universal, 139a Emerson Pl., Bklyn., N. Y.

JAPANESE Model Airplane Tissue, 32 colors, also Wood Veneer. Send for samples. See our ad. this paper with Jap. Girl's Face. Whitfield Paper Works, Importers, 12 Vestry Street, New York City.

INTERESTING new catalog 5c. Giant bargain box of valuable scrap balsa, 50c. Viking Aircraft, Hamilton, O.

AVIATION—INSTRUCTION—EQUIPMENT

ARMY Air Corps gives one year free flying course, 256 hours solo flying. Salary while learning. Information booklet telling how to qualify and apply, 20c. Used Airplanes, $85 and up. Catalog 10c. Federal Equipment Co., Dept. 10, Deerpark, Ohio.

AVIATION—Airminded Young Men interested in entering Aviation as Apprentices. Write, enclosing stamp. Mechanics Universal Aviation Service. 12883 Mansfield, Dept. D, Detroit, Mich.

DON'T Buy anything until you get Ort's 1934 Aviation Material Catalogue. Prices are lower. Send one thin dime today. Karl Ort, 703 W. Poplar St., York, Pa.

OLD COINS WANTED

OLD Money Wanted. $5.00 to $2500.00 each paid for old coins. Buying catalogue 10c. Bob Cohen, Dept. 32, Muskogee, Okla.

CHEAPER TENNIS For You!
EARN REAL MONEY, TOO!
New, amazingly simple device NOW enables anyone to re-string tennis rackets at big savings or for BIG PROFITS! Write today for FREE details and catalog of tennis equipment. H. E. WILLS CO., 1047 W. 47th St., Dept. 77-23, Chicago.

Buy Real "FACTORY-FRESH" GUT strings direct-from-factory-to-you at Low cost. Silk Strings, too. Write!

The Aerodynamic Design of the Model Plane

(Continued from page 41)

the airplane noses up, assuming a position shown in Fig. No. 87. The angle of attack increases when this occurs and the ship moves in the direction indicated by the arrow marked D, Fig. No. 87, after it has lost some of its speed, due to the increased flying angle.

Now, when flying in this position, the angle of the stabilizer has been increased so that the air flow is striking it at a positive angle. This causes a force (S′) on the stabilizer which acts upward. Thus by increasing its angle of flight the force on the stabilizer has changed from a force acting downward to a force acting upward.

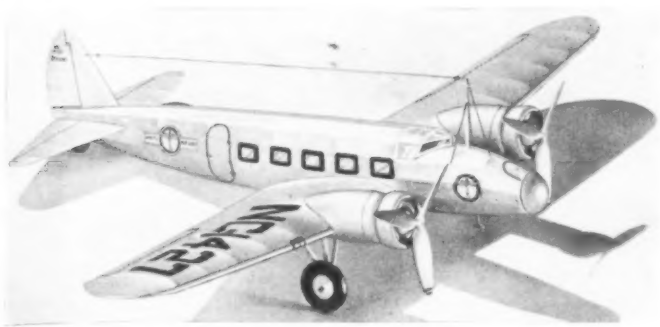
Thus we see that the force on the stabilizer changes in direction and intensity with a change of the flying angle of the ship. The greater the change of this angle, the greater is the change in the intensity of the force.

The important point about this fact is that it may be applied to give the airplane great longitudinal stability as in the example described.

How these force movements and changes may be applied to accomplish the results desired and the theory of dynamic longitudinal stability will be discussed in our next installment. Until then, "happy landings."

COMET MODELS FLY—*and How!*

100% Satisfaction Guaranteed—or Money Refunded!



All Comet models have always had a reputation for actual flying, as well as remarkable simplicity of construction. Comet plans are completely detailed, created and perfected by an outstanding expert model engineer. You can buy any Comet model with confidence, because Comet guarantees 100% satisfaction, or your cash refunded!

THE BOEING TRANSPORT

23″ Wingspan—Flying Scale Model

A complete Kit: Printed balsa rib, bulkhead sheets—longeron strips—sandpaper—rubber motor—balsa leading, trailing edges—1⅛″ dia. wheels—printed prop blade outline—silver dope—shred, bamboo—noseblock—cement—banana oil—window cellophane—Boeing insignia, numerals—balsa cylindrical nacelles, engine cowlings—package with washers, prop. shafts, rear hook, bushings, fittings. Two large FULL size detailed plans. Jap tissue, waxed tissue. What a BARGAIN is this twin-motored Boeing Kit at only $1.50 prepaid or at Dealers. **$1.50**

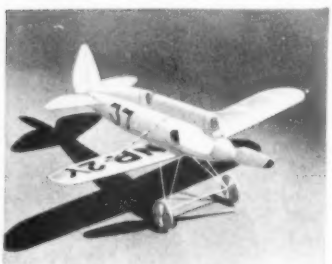
CHOOSE FROM THESE FAMOUS COMET MODELS!

FOKKER D-7
17″ wingspan **75c**

PHANTOM FURY
15″ wingspan **50c**

ZIPP
13½″ wingspan **50c**

AERONCA
16″ wingspan **75c**



HOWARD RACER
14″ wingspan **75c**

PAGE RACER
12½″ wingspan **50c**

C-1 ARMY PURSUIT
15″ wingspan **75c**

RED RACER
15½″ wingspan **$1.00**

CURTISS HAWK
11½″ wingspan **50c**

DIPPER
12½″ wingspan **50c**

CURTIS ROBIN
17½″ wingspan **$1.00**

U. S. NAVY RACER
13″ wingspan **$1.00**

USE ORDER-BLANK ON BACK COVER FOR ORDERING THESE KITS. SEE BACK COVER FOR LATEST MODELS.

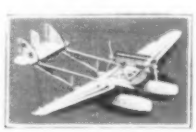
ALL PRICES POSTPAID OR AT YOUR DEALER

Buy Comet Planes in Squadrons and Save Money!

Squadron No. 1—Curtiss Robin, Red Racer, Army C-1 Pursuit, The Dipper.
Saves you $1.00. Four of Comet's best flyers cost you only $2.25 in the Squadron Box instead of $3.25 if bought as separate kits: **$2.25**

Squadron No. 2—The Dipper, Zipp Flyer, The Phantom Fury
Saves you 50c. These 3 Comet planes cost 50c each or $1.50 if bought separately, but by buying them in Squadron Box No. 2 you can get them for only $1, thus saving 50c. **$1.00**

Squadron No. 3—Page Racer, U. S. Navy Racer, Howard Racer, Curtiss Hawk
Saves you $1.00. Four great kits, worth $2.75 if bought separately, but packed in Squadron Box for only $1.75—a saving of $1.00 ..... **$1.75**

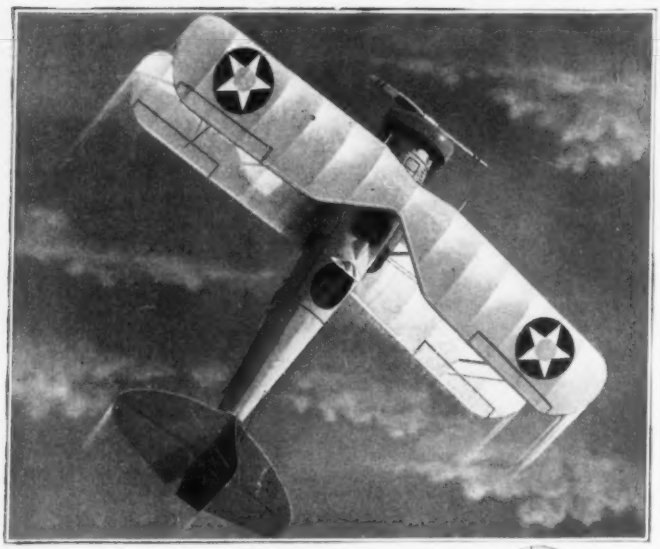


The Balbo Savoia-Marchetti

An accurate scale model of the great ships that flew from Italy to the Chicago World's Fair last summer! This is a big, solid non-flying scale model—13½″ wingspan! Notice the many details in the illustration above. Comet quality throughout, only..... **75c**

COMET MODELS LEAD

IN QUALITY, VALUE *and* COMPLETENESS!



COMET

It's **NEW**

The VOUGHT CORSAIR

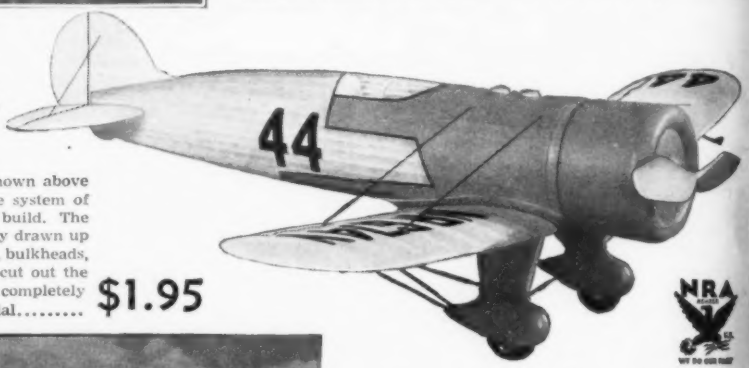
(23" Wingspan)

This Comet model is a "honey!" All of the well known Comet features are in this kit. The U. S. N. Vought Corsair is the most dependable ship of the U. S. Naval Air Corps, and this model incorporates all of its late gadgets and safety devices. This plane is noted for sturdiness and all-around service under all conditions. The service rendered by these ships in Nicaragua was invaluable. Space does not permit a complete list of features in this kit. All difficult parts furnished complete or semi-finished. Cowling, motor, wheel parts, wheels, ribs and formers printed out, insignia and markings brilliantly printed in color on gummed paper, windshields printed out and many other special features. No skimping—this is a big package full of all necessary materials, plenty of everything, especially colored dope and cement. A sensational value..... **$2.50**

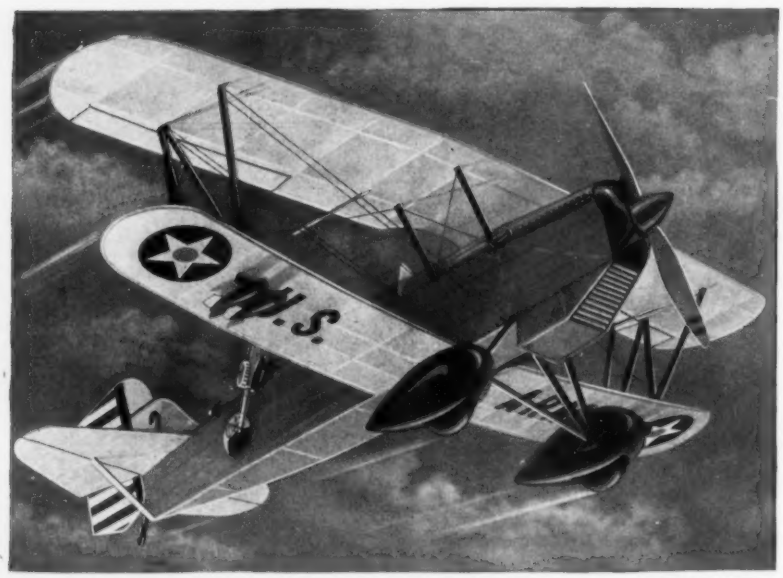
The NEW WEDELL-WILLIAMS

25½" Wingspan

The design and construction of the Wedell-Williams shown above is typical of Comet's leadership. Comet uses a simple system of fuselage construction which makes this model easy to build. The large, actual size plan is carefully engineered, not merely drawn up in any old way—and is chuck-full of details. All formers, bulkheads, etc., are imprinted on Balsa wood—all you need do is cut out the parts with a razor blade. Difficult parts are semi or completely finished. And Comet gives you plenty of surplus material..... **$1.95**



NRA



The Sensational New CURTISS-FALCON

24" Wingspan—19" long

Comet's latest and greatest triumph—the Curtiss-Falcon—a strikingly realistic model of the ship that is the Army's most valuable aid during war. It has been truly called "The Eyes of the Army." Comet has reproduced in a true flying scale model, the newest ship of this type, fully equipped for observation and light bombing. Every detail of this big plane has been faithfully incorporated in this dandy model, as the photograph at the left shows you. Note the realistic observer's machine-gun, the streamlined wheel pants, the exhaust pipes and other details. This kit is absolutely complete—it is equipped with Comet's well-known thoroughness. Both flying and scale propeller are furnished. Here is a real value—it took all of Comet's skillful engineering, manufacturing genius and added facilities in its new big plant to produce this outstanding kit at the low price of **$1.95**

COMET MODEL AIRPLANE & SUPPLY COMPANY
2509 W. Cermak Road, Dept. M34, Chicago, U. S. A.

( ) Send articles listed. I'll pay postman for articles, C.O.D. fee, postage, on delivery.

( ) I enclose $.....for articles listed. Comet pays postage

NAME .....

STREET .....

CITY .....STATE .....

SEND NO MONEY—JUST MAIL COUPON

All prices postpaid or at your dealer

Dealers!

SALES GUARANTEED on Comet's great Dealer Plan, backed by National Advertising! Fine profits made! WRITE!

100% Satisfaction Guaranteed!

Order the convenient C.O.D. way: mark, mail coupon—pay for planes, C.O.D. fee, postage on delivery! We pay postage on cash orders. Remit cash by Money Order—if Check, add 15c extra. CANADIANS: No C.O.D., stamps, nor coin. International Money Order only, plus 20% extra. HURRY! ORDER NOW—FAMOUS COMET SERVICE WILL AMAZE YOU!

Colored Catalog!

Only 5c

Finest catalog out! Send for yours—HURRY!

Buy from Comet Dealers—or Send Direct

D

v

IR

omet
most
odel
lane
ions,
able,
. All
ling,
gnia
ind-
ping

50

RA

N

rtis-
ship
aring
f the
ying
fully
very
ncor-
ph at
ver's
the
abso-
well-
pro-
took
aring

95

d
g!

uleg
for
RY!

TH